

PACIFIC SEABIRDS



A Publication of the Pacific Seabird Group

Volume 46, Number 2

2019

PACIFIC SEABIRD GROUP

Dedicated to the Study and Conservation of Pacific Seabirds and Their Environment

The Pacific Seabird Group (PSG) is a society of professional seabird researchers and managers dedicated to the study and conservation of seabirds. PSG was formed in 1972 out of a need for increased communication among academic and government seabird researchers. The principal goals of PSG are to (1) increase the quality and quantity of seabird research through facilitating exchange of information; (2) identify and assess the importance of threats to seabird populations; and (3) provide government agencies and others with expert advice on managing populations of seabirds. PSG is headed by an Executive Council composed of members volunteering their time. Members include biologists, wildlife managers, students, and conservationists from the United States, Mexico, Canada, Japan and 12 other countries. PSG annual meetings and publications provide forums where members can share their findings on all research topics relating to Pacific seabirds and discuss local and large scale conservation issues. Abstracts for meetings are published on our website. PSG publishes the on-line bulletin Pacific Seabirds (formerly the PSG Bulletin; www.pacificseabirdgroup.org) and the journal Marine Ornithology (www.marineornithology.org). Other publications include symposium volumes and technical reports; these are listed near the back of this issue. PSG is a member of the Ornithological Council and the American Bird Conservancy. Annual dues for membership are US\$50 (individual); US\$35 (student, undergraduate and graduate); and US\$1,500 (Life Membership, payable in five US\$300 installments). Two-year memberships are also available for individuals for US\$90 and for students for US\$55. Dues are payable on our website or by check to the Treasurer; see the PSG website or the Membership Information at the back of this issue.

Website

<http://www.pacificseabirdgroup.org>

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The Pacific Seabird Group is a nonprofit organization incorporated under the laws of the State of California. Contributions to the Pacific Seabird Group are tax deductible to the fullest extent allowed by U.S. law (IRS Section 501[c][3]).

Pacific Seabirds

This on-line bulletin reports on the work and committee activities of the Pacific Seabird Group, conservation news, and other items of importance to conservation of seabirds in the Pacific Ocean. The bulletin is published twice-yearly on the PSG website and reports membership news and archives PSG activities. This issue provides current and recent seabird work to PSG members for 2019. Back issues of Pacific Seabirds are posted on the group's website.

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Marine Ornithology

Marine Ornithology is published by the Pacific Seabird Group on behalf of a consortium of seabird groups: African, Australasian, Dutch, Japanese, Pacific, and UK. The journal is published two times a year and publishes contributed papers, forum articles, and book, website and software reviews, on all aspects of marine ornithology worldwide. For details on submitting to the journal, please go to marineornithology.org.

Change of Address

Send changes of address to the PSG Membership Coordinator, **Emma Kelsey**, membership@pacificseabirdgroup.org

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REGIONAL REPORTS FOR 2019

Compiled by: Robb Kaler, Edited by: Jennifer Lang

Regional Reports summarize current and recent seabird work to PSG members. Regional Reports generally are organized by location of the work, not affiliation of the biologist. They should not be cited without permission of the researchers.

ALASKA & RUSSIA

Compiled by Marc Romano

ALASKA PENINSULA

Annual seabird monitoring at Chowiet Island (Semidi Islands group) was led by **Nora Rojek** (Alaska Maritime National Wildlife Refuge) with summer-long field crews consisting of **McKenzie Mudge** and **Kevin Pietrzak**. They collected productivity, diet, and population data on a variety of species including Common and Thick-billed Murres (*Uria aalge* and *U. lomvia*), Rhinoceros and Parakeet Auklets (*Cerorhinca monocerata* and *Aethia psittacula*), Horned and Tufted Puffins (*Fratercula corniculata* and *F. cirrhata*), Black-legged Kittiwake (*Rissa tridactyla*), Glaucous-winged Gull (*Larus glaucescens*), and Northern Fulmar (*Fulmarus glacialis*).

ALEUTIAN ISLANDS

Annual seabird monitoring at Buldir and Aiktak Islands was led by **Nora Rojek** (Alaska Maritime National Wildlife Refuge) with summer-long field crews consisting of **Stacie Evans**, **Daniel Schultz** and **Reina Gavin** on Buldir. They collected productivity, diet and population data on a variety of species including Common and Thick-billed Murres (*Uria aalge* and *U. lomvia*); Parakeet (*Aethia psittacula*), Least (*A. pusilla*), Whiskered (*A. pygmaea*), and Crested (*A. cristatella*) Auklets; Horned and Tufted Puffins (*Fratercula corniculata* and *F. cirrhata*); Black-legged and Red-legged Kittiwakes (*Rissa tridactyla* and *R. brevirostris*); and Fork-tailed and Leach's Storm-petrels (*Hydrobates furcatus* and *H. leucorhous*). **Sarah Youngren** and **Dan Rapp** on Aiktak Island monitored Common and Thick-billed Murres; Ancient Murrelets (*Synthliboramphus antiquus*); Horned and Tufted Puffins;

Glaucous-winged Gull (*Larus glaucescens*), Fork-tailed and Leach's Storm-petrels; and Double-crested, Red-faced, and Pelagic Cormorants (*Phalacrocorax auritus*, *P. urile*, and *P. pelagicus*).

Jonathan Plissner (Island Conservation) and volunteers **Abby Newman**, **Megan Vynne**, and **Christy Wails** (Northern Illinois University graduate student) with support from the U.S. Fish and Wildlife (USFWS) Alaska Maritime National Wildlife Refuge staff completed an 11-year post-rat eradication monitoring trip to Hawadax Island in June 2019. Automated acoustic sensors were deployed on the island to monitor for nocturnal seabirds with a focus on Leach's Storm-petrel, and searches for Tufted Puffin and Glaucous-winged Gull nests were conducted.

Peter Kappes joined **Nora Rojek** (USFWS) and **Heather Renner** (USFWS) on a research cruise in the central and western Aleutians to assess presence/absence of invasive rodent populations as part of feasibility studies for possible rodent eradication projects on several islands managed by the Alaska Maritime National Wildlife Refuge.

BERING AND CHUKCHI SEAS

Kathy Kuletz and **Liz Labunski** (U.S. Fish and Wildlife Service [USFWS]) completed another year of offshore seabird surveys (now spanning 2006-2019) in the Bering, Chukchi, and Beaufort Seas, with support of the Bureau of Ocean Energy Management. Surveys were coordinated as part of several multidisciplinary research projects with a variety of partners including the North Pacific Research Board Arctic Integrated Ecosystem Study, Environment Canada, National Oceanic and Atmospheric Administration-Alaska Fisheries Science Center,

University of Alaska, Fairbanks, and Woods Hole Oceanographic Institute. In 2019, seabird observers for the Bering and Arctic surveys included **Kathy Kuletz**, **Liz Labunski**, **Brendan Higgins**, **Marty Reedy**, **Charlie Wright**, **Linnaea Wright**, and **Tamara Zeller**. Seabird observers were placed on eight research cruises from July to early December and conducted approximately 11,273 km of transects; these data will be archived in the North Pacific Pelagic Seabird Database. **Kathy**, **Liz**, **Dan Cushing** (Pole Star Ecological Research LLC), and collaborators will continue to examine seabird distribution and abundance with respect to environmental conditions in this rapidly changing sub-Arctic and Arctic ecosystem.

The Alaska Maritime National Wildlife Refuge (AMNWR) conducted a research cruise to St. Matthew Island in late July and early August aboard the R/V *Tiglaá*. The cruise was led by **Marc Romano** and Captain **John Faris** (USFWS-AMNWR) and supported by the crew of the R/V *Tiglaá*.

Brie Drummond and **Tony DeGange** (USFWS-AMNWR) both collected population and productivity data for Common Murres (*Uria aalge*), Thick-billed Murres (*Uria lomvia*), Black-legged Kittiwakes (*Rissa tridactyla*), and Pelagic Cormorants (*Phalacrocorax pelagicus*). **Marc Romano**, **Aaron Christ**, and **Robb Kaler** (USFWS) completed an island-wide census for Pelagic Cormorants and Red-legged Kittiwakes (*Rissa brevirostris*). The team also conducted additional seabird observations and explored methodology to recensus Alaska seabird colonies.

In March 2019, the Circumpolar Seabird Group (CBird; an Arctic Council Expert Network) met in Iceland, and **Kathy Kuletz** participated as the U.S. representative, remotely from Alaska.

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Kathy worked with others in CBird to submit a draft seabird section for the ICES/PICES/PAME Working Group on Integrated Ecosystem Assessment for the Central Arctic Ocean, which includes ‘gateway’ regions linked to the Central Arctic. The revised draft assessment will be submitted to the Arctic Council in December 2019.

In May, the USFWS began receiving reports of dead and dying seabirds from the northern Bering and Chukchi Seas. From late June to early August, thousands of Short-tailed Shearwaters (*Ardenna tenuirostris*) were reported dead and washing up on beaches in the Bristol Bay region, or observed weak and attempting to feed from salmon gillnets in inland waters. By mid-August, the shearwater die-off had extended north, in smaller numbers but widespread locations, into the northern Bering and Chukchi Seas along the coasts of Alaska and the Chukotka Peninsula of Russia. Puffins, murres, and auklets were also reported, but at much lower numbers than shearwaters. The USFWS worked closely with partners at the National Park Service, Alaska Sea Grant Marine Advisory Program, Alaska Department of Fish & Game, Alaska Migratory Bird Co-management Council, Tribal partners, and the Coastal Observation and Seabird Survey Team to collect information, synthesize records, and submit carcasses for testing to the U.S. Geological Survey’s (USGS) National Wildlife Health Center and Alaska Science Center. Initial results indicate starvation as the cause of death for most locations. However, in southeast Alaska, exposure to saxitoxin (a biotoxin associated with paralytic shellfish poisoning) was linked in June to a localized die-off of breeding Arctic Terns (*Sterna paradisaea*). With the exception of the localized die-off of terns in southeast Alaska, starvation has been identified as the cause of death. The USGS is actively investigating how algal bloom biotoxins like saxitoxin affect birds. Little is known about the occurrence or effects of these toxins on wild seabirds, and it is difficult to detect



Black-legged Kittiwake. Photo credit: David Pereksta

the toxins in emaciated, dead birds.

Annual seabird monitoring at St. Paul and St. George Islands was led by **Marc Romano** (USFWS-AMNWR) with summer-long field crews consisting of **Sarah Tanedo** and **Briana Bode** (St. Paul), and **Frank Mayer**, **Erin Lefokowitz**, and **Kacey Srubas** (St. George). Both crews collected data on a variety of species including Common Murres, Thick-billed Murres, Least Auklets (*Aethia pusilla*), Black-legged Kittiwakes, Red-legged Kittiwakes, and Red-faced Cormorants (*Phalacrocorax urile*). The crews collected productivity, diet, adult survival and population data.

Douglas Causey (University of Alaska Anchorage [UAA]) and **Veronica Padula** (University of Alaska Fairbanks [UAF]) travelled to St. Matthew and Hall Islands in July to August 2019 aboard the USFWS-AMNWR vessel R/V *Tigla* to continue their multiyear multiplex study of the dynamics of ecosystem change on Beringian Seabirds. Initial results of a 2-year study in this area indicates that biotoxins (saxitocins, domoic acid) associated with Harmful Algal Blooms (HABs) are increasingly prevalent in Least Auklets (*Aethia pusilla*), Crested Auklets (*Aethia cristatella*), and Northern Fulmars (*Fulmarus glacialis*). Some of the birds were malnourished, with significantly reduced body mass,

but it is not clear whether the biotoxins played a role. These same specimens are being examined for quantification of presence, type, and abundance of micro- and nano-plastics by UAA undergraduates **Janelle Trowbridge** and **Danielle Owens**, and their work was recently highlighted in October 2019 at the Plastic in the Arctic Workshop at Harvard University organized by the Icelandic Chair of the Arctic Council. They are using a variety of methods for detection and identification, including broadspectrum and focused ultraviolet rays, and so far it appears that most seabird species in most areas have detectable levels of contamination.

Veronica Padula is continuing study of the presence and diversity of the associated phthalate plasticizers in breeding seabirds throughout the Bering Sea region that are now understood to directly affect embryonic development and reproductive success. **Veronica** is working to understand the relative effects of trophic level foraging, geographic location, and age on phthalate exposure, and anticipates submitting a substantial update early next year to the first publication on their presence and effect (Causey D, Padula V. 2015. Phthalates in western Aleutian Islands seabirds. AccessScience <https://www.accessscience.com/content/>

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YB150685).

Alexzandra DePue and **Brittney DePue** (UAA Causey Lab) are reconstructing the food web dynamics of the Aleutian and the northern Bering Sea seabird community using stable isotope analyses of food, tissue, and feathers of archival specimens collected in the last decade. Preliminary results suggest that diet and foraging patterns are becoming increasingly more variable, with some species (e.g., Black-legged Kittiwakes, Pigeon Guillemot [*Cephus columba*]) appearing to feed at lower trophic levels than previously known.

Maile Branson (UAA, UAF) continues her PhD research focused on the diversity of Avian Influenza subtypes among Beringian seabirds, primarily from the Pribilof and St. Matthew Islands. Her work with **Douglas Causey** and **Eric Bortz** (UAA) indicates that new subtypes associated with Black Guillemots (*Cephus grylle*) and Glaucous Gulls (*Larus hyperboreus*) may have origins in High Arctic circumpolar regions. High titres were observed in birds with elevated biotoxins, which are known to suppress immune function, but it is not clear at this time whether these are related.

GULF OF ALASKA

Kodiak National Wildlife Refuge biologist **Robin Corcoran** (U.S. Fish and Wildlife Service [USFWS]) completed breeding nearshore marine bird surveys in June and August on the east side of Kodiak Island. This is a skiff-based line transect survey with the goal of determining population estimates, long-term trends, and habitat associations for key marine bird species including Marbled Murrelet (*Brachyramphus marmoratus*), Pigeon Guillemot (*Cephus columba*), Arctic and Aleutian Tern (*Sterna paradisaea*) and *Onychoprion aleuticus*), Harlequin Duck (*Histrionicus histrionicus*), and Black Oystercatcher (*Haematopus bachmani*). Approximately 20% of the 1,600 km shoreline was systematically surveyed.

Yumi Arimitsu, **Sarah Schoen**, **John Piatt**, **Caitlin Marsteller**, and **Gary Drew** (U.S. Geological Survey [USGS]) completed another year of seabird and forage fish monitoring in Lower Cook Inlet during summer 2019. This project, supported by the USGS Outer Continental Shelf program and Bureau of Ocean Energy Management aims to document the status and trends of seabirds and forage fish by repeating surveys conducted in the late 1990s. The work includes at-sea surveys for marine birds, acoustic-trawl surveys for forage fish, physical and biological oceanography, as well as monitoring of population and productivity of Common Murres (*Uria aalge*) and Black-legged Kittiwakes (*Rissa tridactyla*) at two colonies.

Kathy Kuletz and **Liz Labunski** (USFWS) worked with **Dan Cushing** (Pole Star Ecological Research LLC), to continue the Seward Line long-term monitoring in the northern Gulf of Alaska (GOA), funded by the North Pacific Research Board. In 2018, this project was expanded to three seasons over a larger area, and in 2019, **Kathy** and others continued to conduct seabird surveys as part of the Northern Gulf of Alaska-Long Term Ecosystem Research (NGA-LTER) study, with funding from National Science Foundation and Gulf Watch Alaska. The team also began collaboration with the California Current Ecosystem LTER team, to compare seabird response to changes in the two systems. As part of the USFWS offshore program, **Callie Gesmundo** (USFWS) joined a University of Alaska Fairbanks project to explore seamount communities in the GOA. **Callie** conducted seabird surveys during the 14-day expedition on board the R/V *Sikuliaq*. Crews completed approximately 5,622 km of surveys during the GOA projects, and those data will be added to the North Pacific Pelagic Seabird Database.

Seabird research and monitoring continued on Middleton Island in 2019, conducted by an international team from Canada, Japan, Britain and the United

States. The work was overseen by **Kyle Elliott** (McGill University), **Morgan Benowitz-Fredericks** (Bucknell University), and **Scott Hatch** (Institute for Seabird Research and Conservation). **Scott** and **Martha Hatch**, joined by **Shawn** and **Kelly Pummill**, opened the season in early April for spring cleaning, facility maintenance, and camp set-up. The core research team—**Kyle**, **Morgan**, camp leaders **Shannon Whelan** (McGill), **Drew Sauve** (Queen's University, Canada), and **Jenna Schlenker** (McGill), with **Hannes Schraft** (McGill), **Hannah Weipert** (Texas), **Abe Turner** (Michigan), **Dan Netti** (New York), **Sierra Pete** (Bucknell), **Catherine Lee-Zuck**, **Frederique Tremblay**, and **Emily Choy** (McGill), **Naya Sena** (Hokkaido University), **Akiko Shoji** (University of Tsukuba), **Emma Lachance Linklater** (Queen's), **Ethan Hermer** (University of Ottawa), and **Baptiste Garde** (Swansea University) arrived at intervals from early May through July and continued the work through August 15. **Jonathan Green** (University of Liverpool) provided on-site training for the implantation of heart-rate monitors in Black-legged Kittiwakes and Common Murres. **Kristen Gorman** and **Anne Schaefer** (Prince William Sound Science Center) launched a second year of seasonal tracking of Tufted Puffins (*Fratercula cirrhata*) using geolocators. Lingering effects—or a re-emergence—of the recent marine heatwave were evident in 2019, especially in exceptional wide-range foraging by Black-legged Kittiwakes from spring arrival through chick-rearing.

With primary financial support from the National Fish and Wildlife Foundation, the PSG Aleutian Tern Technical Committee convened a Conservation Planning meeting in Anchorage, Alaska, April 8-10, 2019. **Jan Caulfield** facilitated, and statisticians **Trent McDonald** and **Jason Carlisle** (Western Ecosystems, Inc.) served as project consultants. The meeting objective was to facilitate a common understanding of

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alternative sampling and population estimation methods for Aleutian Terns (*Onychoprion aleuticus*) at breeding colonies, including assumptions, advantages, and limitations.

Melissa Gabrielson (U.S. Forest Service [USFS]) conducted the Copper River Delta Aleutian Tern aerial survey on May 21, 2019. The survey encompassed the entire Copper River Delta from the Heney Mountain Range to Controller Bay. Approximately 15 different congregations were observed during the aerial survey, and at least 4 colonies were identified. Most were observed on the west Copper River Delta (n=13). Pictures were taken to document flock size. Approximately

chicks on the Kodiak road system, a record high since banding efforts began in 2017. They also collected habitat data at 75 Aleutian Tern nests and corresponding paired points. **Jill Tengeres, Melissa Gabrielson, Susan Oehlers** (USFS), and others deployed 16 Song Meter units at 13 Aleutian Tern colonies for a total of 1,446 recording days. Acoustics data will be analyzed by Conservation Metrics, Inc.

Mike Goldstein (USFS), **Susan Oehlers, Trent MacDonald, Jason Carlisle**, and **Jill Tengeres** continued work initiated in 2018, testing the use of drones to survey tern colonies in Yakutat (Black Sand Spit, Italio, Ankau) and Kodiak. They collected approximately

in Prince William Sound from May 22 to July 3 and on Alaganik Colony from June 6 to 26. A total of 45,335 photos were collected on the Alaganik Colony and 67,568 on the Ternagain Colony. Reconyx camera footage indicated the presence of chicks, provisioning of chicks by adults, and adult presence/absence. **Susan Oehlers** deployed 23 nest cameras. Nine nests were depredated during incubation, seven nests had unknown fates, six nests successfully hatched chicks, and one nest was abandoned during the incubation period.

Jill Tengeres, Robin Corcoran, Andrea Mendez-Bye, Morgan Barnes, and **Melissa Crews** placed nest cameras on 54 Aleutian Tern nests, and monitored an additional 62 nests without cameras. Nest cameras provided data on nest survival rates, causes of nest failure, and chick provisioning.

Martin Renner conducted photographic sampling of prey delivery to establish a baseline diet for Aleutian Tern chicks. Sampling took place in Yakutat, Kenai Peninsula, and Kodiak. Comparative opportunistic images of Arctic Tern bill loads were taken at Yakutat, Kodiak, and Anchorage. Image review and prey sample identification continues.

Mike Goldstein recovered two geolocators from birds tagged in 2010, and sent the tags to the British Antarctic Survey to ascertain whether they can acquire the data stored on board. This is a total of four new tags in addition to the six discussed in the 2019 publication (Goldstein, M.I., Duffy, D.C., Oehlers, S., Catterson, N., Frederick, J. and S. Pyare. 2019. Interseasonal movements and non-breeding locations of Aleutian Terns *Onychoprion aleuticus*. Marine Ornithology 47: 67-76).

Sanjay Pyare (University of Alaska Southeast) completed five months of Aleutian Tern international research and networking with Indonesian researchers, government agencies, and students, supported by a 2018-2019 Fulbright award entitled "Aleutian Tern migration research as a flagship for Indonesian-



Rhinoceros Auklet. Photo credit: David Pereksta

116 birds were observed, and flock size ranged from 1 to 20 birds.

Kelly Nesvacil (Alaska Department of Fish and Game [ADFG]), **Don Lyons** (Audubon/Oregon State University [OSU]), **Robin Corcoran** (USFWS), **Jill Tengeres** (OSU), and **Tori Rhodes** (ADFG) deployed ten 2-gram solar Platform Transmitting Terminal tags on Aleutian Terns (five terns at the Middle Bay colony and five terns at the Burton Ranch colony). **Jill Tengeres** and USFWS Volunteers **Andrea Mendez-Bye, Morgan Barnes**, and **Melissa Crews** banded 29 Aleutian Tern adults and 12 Arctic Tern (*Sterna paradisaea*)

6,500 photos in Yakutat using a mix of census and survey sampling methods. They completed visual surveys (direct counts) during all flights to estimate the number of flying birds and the species ratio.

Martin Renner (Tern Again Consulting) surveyed using a drone in Yakutat, Homer, Kenai Peninsula, and Kodiak. Some way-points sampled earlier by West, Inc. were replicated and alternative sampling protocols were tested. All photographs collected from drones are under review.

Melissa Gabrielson deployed a Reconyx camera on Ternagain Colony

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U.S. collaboration, conservation and education.” He worked with local students, non-government organizations, agencies, researchers, and community members, promoting migratory bird research and conducting surveys for wintering terns. An additional tern publication includes: Yordan, K., B. Emmanuel, F.N. Tirtaningtyas, S. Pyare, and M.I. Goldstein. 2019. Locating and identifying non-breeding Aleutian Terns *Onychoprion aleuticus* in Indonesia. *BirdingASIA* 31: 28-32.

Sam Stark (MSc student, Oregon State University) completed fieldwork for his thesis research with **Dan Roby** at Oregon State University and will defend his thesis in December 2019. His research, which was funded by the National Fish and Wildlife Foundation and the Exxon Valdez Oil Spill Trustee Council, is part of a long-term effort led by **David Irons** (USFWS, retired) and **Robb Kaler** (USFWS) to restore the breeding population of Pigeon Guillemots in Prince William Sound, Alaska, in the aftermath of the Exxon Valdez oil spill. **Sam’s** project found that the removal of introduced mink (*Neovison vison*) from the Naked Island Group in central Prince William Sound resulted in an immediate and sustained increase in guillemot abundance and nesting success. **Sam’s** work also evaluated the use of artificial social attraction to encourage both Pigeon Guillemots and Parakeet Auklets (*Aethia psittacula*) to nest in historical habitat that was abandoned following mink introduction and the Exxon Valdez oil spill. Social attraction resulted in at least one nesting attempt by Parakeet Auklets in 2018, the first on Naked Island since the oil spill, and increased attendance by Pigeon Guillemots at sites where social attraction was deployed.

SOUTHEAST ALASKA

Tania Lewis (National Park Service [NPS], Glacier Bay National Park and Preserve) monitored Glaucous-winged Gull (*Larus glaucescens*) productivity in Glacier Bay to inform native egg

harvest for the eighth season (for background see Lewis et al., *Marine Ornithology* 45:165-174). After four years of collaborative experimental egg harvests (2015-2018), 2019 marked the first year of a tribally-led egg harvest. Four members of the Hoonah Indian Association harvested all eggs at a single gull colony (Geikie Rock) on May 30, 2019. **Tania** met harvesters and trained them how to collect required monitoring data including the number of nests encountered and number of eggs per nest as they harvested. Harvesters collected 119 eggs from 95 nests. **Tania** and **Kiana Young** (NPS, Glacier Bay National Park and Preserve) returned to the colony on June 25 and conducted a ground survey to assess the colony’s success in replacing clutches and recorded 207 eggs in 97 nests. **Tania** and **Kiana** also conducted a vessel-based survey on August 6 and counted 270 adults and 65 chicks of the year, indicating a successful breeding season at this location despite the complete egg removal in May.

At St. Lazaria Island, **Brendan Higgins** and **Jillian Soller** (U.S. Fish and Wildlife Service Alaska Maritime National Wildlife Refuge) collected productivity, population, and diet data on Common Murres (*Uria aalge*), Thick-billed Murres (*Uria lomvia*), Rhinoceros Auklets (*Cerorhinca monocerata*), Tufted Puffins (***Fratercula cirrhata***), Black Oystercatchers (*Haematopus bachmani*), Glaucous-winged Gulls, Fork-tailed Storm-petrels (*Oceanodroma furcata*), Leach’s Storm-petrels (*O. leucorhoa*), and Pelagic Cormorants (*Phalacrocorax pelagicus*).

WASHINGTON & OREGON

Compiled by **Rachael Orben**

OREGON & WASHINGTON-WIDE

Work continued to develop sampling designs and data analysis procedures for site-specific protocols to implement the “National Protocol Framework for

Monitoring Common Murre (*Uria aalge*) and Brandt’s Cormorant (*Phalacrocorax penicillatus*) Breeding Colonies in the California Current System” at sites in Oregon and Washington. **Andy Royle** (U.S. Geological Survey [USGS]) and **Nadav Nur** (Point Blue Conservation Science), worked with refuge biologists **Shawn Stephensen** (U.S. Fish and Wildlife Service [USFWS]), **Sue Thomas** (USFWS), and other partners to design select elements of protocols that align with the aforementioned Protocol Framework. These sampling designs will allow both large-scale (California Current System-wide) and local inference on population trends and distribution of both species. **Steve Holzman** (USFWS), the USFWS’ Pacific Seabird Program Data Manager, worked on a number of priority data management projects, including the Pacific Seabird Monitoring Database, updating the California Seabird Colony Catalog, supporting the Hawaii Seabird Colony Catalog update (USGS), assembling a Geospatial Information System (GIS) Seabird Colony database, designing field data entry apps for Tufted Puffin (*Fratercula cirrhata*), and advising the USFWS Albatross Demography Program. Work is ongoing to fill a Coordinator position for the USFWS Pacific Seabird Program to advance seabird monitoring, conservation and coordination among USFWS regional offices in California, Oregon, and Washington. **Roberta Swift, Rob Doster, and Holly Freifeld** (all USFWS) did consecutive 120-day details, where each served as Interim Coordinator in 2019.

In April 2019, the Marbled Murrelet Effectiveness Monitoring Program provided a summary report on monitoring results from at-sea surveys for Marbled Murrelets (*Brachyramphus marmoratus*; MAMU), which occurred in nearshore waters in the Strait of Juan de Fuca, Puget Sound, and at the San Juan Islands (i.e., Conservation Zone 1), and off northern & central Oregon (i.e., Conservation Zone 3) in 2018. Reports are completed every five years to assess

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Brandt's Cormorant. Photo credit: David Pereksta

population trends and nesting habitat in the Northwest Forest Plan area, which includes most of the murrelet's range in Washington, Oregon, and California. This and other program reports can be accessed online at: <https://www.fs.fed.us/r6/reo/monitoring/murrelet/>. The goal of this monitoring program is to estimate MAMU populations and trends and to evaluate the effectiveness of the Northwest Forest Plan in conserving MAMU from the Canada-Washington border to central California. The program has used boat-based transects in the coastal waters of this area since 2000 to monitor MAMU, and other seabird species are also recorded. In 2019, at-sea surveys were continued under this program, as follows: surveys off the western coast of Washington were led by **Scott Pearson** and **Monique Lance** (WDFW), and surveys along the coasts of southern Oregon and northern California (from Coos Bay to the southern Humboldt County line) were led by **Craig Strong** (Crescent Coastal Research). In 2019, the MAMU Effectiveness Monitoring Program continued analyses of status and trend of MAMU population and habitat over the 1994–2018 time period, for the program's "25-year Report"; chapter drafts of the report (one chapter for population trend and one chapter for

habitat trend) underwent peer-review in late 2019, and online publication of the report (Forest Service General Technical Report) is expected in 2020. Other contributors to the monitoring program include: **Kim Nelson** (Oregon State University); **Jim Baldwin**, **Nels Johnson**, **Teresa Lorenz**, **Martin Raphael** (U.S. Forest Service), **Deanna Lynch**, **Bill McIver** (coordinator), and **Rich Young** (USFWS). Many qualified seasonal biologists made the population surveys possible in 2019, including: **Kelly Beach**, **Caanan Cowles**, **Chad Norris**, **Jessica Stocking**, **Danielle Devincezni**, and **Darrel Warnock**. The Population team includes **Bill McIver**, **Scott Pearson**, **Craig Strong**, **Deanna Lynch**, **Martin Raphael**, **Rich Young**, **Nels Johnson**, and **Jim Baldwin**. The Habitat team includes **Teresa Lorenz**, **Martin Raphael**, **Rich Young**, **Deanna Lynch**, **Kim Nelson**, and **Bill McIver**.

WASHINGTON

Scott Pearson (Washington Department of Fish and Wildlife [WDFW]), **Thomas Good** (National Oceanic and Atmospheric Administration [NOAA] Northwest Fisheries Science Center), **Peter Hodum** (University of Puget Sound and Oikonos), **Eric Wagner** (independent writer), and **Sue Thomas** (U.S. Fish and

Wildlife Service [USFWS] Washington Maritime National Wildlife Refuge Complex [WMNWRC]) continued their long-term study of reproductive success patterns of Rhinoceros Auklets (*Cerorhinca monocerata*) on Protection (13th year) and Destruction (10th year) Islands, Washington. Burrow occupancy was comparable to long-term averages on both islands, suggesting that the breeding population on Protection Island has recovered following the adult mass mortality event of 2016. Fledging success on Protection (87%) was slightly higher than the long-term average of 79%. On Destruction, fledging success was comparable to long-term averages. Dietary studies were conducted during the early and late chick-rearing stages on both islands, with diet composition on both islands similar to previous years. The diet on Protection continues to be dominated by Pacific sand lance (*Ammodytes personatus*), with the Destruction diet characterized by a much wider variety of forage fish species.

In addition to the Rhinoceros Auklet study, they also continued their conservation research program on Tufted Puffins (*Fratercula cirrhata*), focusing on mapping of active breeding burrows on Smith and Destruction islands and breeding season monitoring and foraging ecology of puffins on Destruction Island. **Sue Thomas**, **Lorenz Sollmann**, and **Juliana Merluccio** (WMNWRC) conducted two Tufted Puffin burrow count and forage fish surveys off Smith Island within the San Juan Islands National Wildlife Refuge in August. The objectives of these surveys were to provide data to **Peter Hodum's** university research lab for the development of a minimal breeding population estimates and analysis of chick diets prior to fledging. On Destruction Island, undergraduate research student **Lilli Patton** (University of Puget Sound) conducted a study of puffin diet by photographing arriving adults with bill loads of prey. She is currently analyzing bill load photos from the 2017-2019 breeding seasons.

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The team also began a complementary study of diet using a genetic barcoding approach on fecal samples collected at puffin burrows.

They also initiated a long-term seabird monitoring program on Jagged and Alexander islands during the 2019 breeding season, deploying trail cameras and acoustic recording units and establishing initial burrow monitoring plots to begin long-term monitoring of population trends among multiple species, including Tufted Puffins, Rhinoceros Auklets, Fork-tailed and Leach's Storm-petrels (*Oceanodroma furcata* and *O. leucorhoa*), and Cassin's Auklets (*Ptychoramphus aleuticus*).

Sue Thomas (WMNWRC) participated in two worst-case scenario oil spill drills at oil refineries within 8 nautical miles of seabird colonies in the Salish Sea. She is also providing input to initial response strategies for seabird colonies in updates of two Geographic Response Plans in the area. **Sue Thomas** also participated in a pilot study to monitor breeding success of burrow-nesting seabirds on Quillayute Needles National Wildlife Refuge.

Sue Thomas, Juliana Merluccio, and **Lorenz Sollmann** conducted one aerial surface nesting seabird survey of 27 islands within Flattery Rocks, Quillayute Needles, and Copalis National Wildlife Refuges on July 9. Through a Memorandum of Understanding with the Makah Tribe, **Sue, Juliana,** and **Lorenz** worked with Tribal Biologist, **Shannon Murphy,** to incorporate aerial surveys of Common Murres (*Uria aalge*) on Tatoosh Island as well. Minimal to no activity was noted on murre colonies with the exception of Carroll and Tatoosh Islands while a new colony was established on Silversides (Washington Seabird Colony #155039). Staff from WMNWRC also completed one early morning survey each of 26 Pigeon Guillemot (*Cephus columba*) colonies on Protection Island and San Juan Islands National Wildlife Refuges in May. They followed the methodology developed by **Joe Evenson** (WDFW) and presented in the proceedings of

the 2003 Georgia Basin/Puget Sound Research Conference. The objective is to periodically reassess abundance of breeding guillemots on refuge islands every 5-10 years and gauge the need for an additional comprehensive survey throughout the Salish Sea. They also participated in the Pacific Flyway Double-crested Cormorant (*Phalacrocorax auritus*) survey of seven islands in the San Juan Islands and Quillayute Needles National Wildlife Refuges in July. Objectives have been expanded to monitor all cormorant species breeding on select refuge islands including Pelagic and Brandt's Cormorants (*Phalacrocorax pelagicus* and *P. penicillatus*). Once again, a limited number of Brandt's Cormorants nests were observed (rare for the Salish Sea).

Scott Pearson, Martin Raphael, and **Teresa Lorenz** conducted nighttime captures for Marbled Murrelets for a study of murrelet diet in Puget Sound. **Martin Raphael, Teresa Lorenz,** and **Tom Bloxton** published an article on outcomes of monitored Marbled Murrelet nests from a 5-year telemetry study in Washington, 2004-2008 (Lorenz et al. 2019, Marine Ornithology 47:157-166).

Elizabeth Phillips is a National Research Council postdoctoral research associate, based at NOAA Fisheries Northwest Fisheries Science Center in Seattle. She is working with **Sandy Parker-Stetter** (NOAA) to quantify the spatiotemporal distribution, abundance, and drivers of euphausiids (krill) in the California Current using acoustic data collected during the Integrated Ecosystem and Pacific Hake Acoustic-Trawl Survey. The time series (2003-2019) being developed will inform research on recent seabird die-offs and colony abandonment events, and facilitate predictions of krill abundance and distribution during marine heat waves and under various climate change scenarios. Protocols for processing acoustic data for krill classification are being formalized so that these data will be standard outputs of NOAA surveys

in the future.

Anna Wuest (NOAA Hollings Scholar), **Jason E. Jannot** (NOAA Northwest Fisheries Science Center), and **Thomas Good** embarked on a modeling project to develop more accurate and less volatile estimates of seabird bycatch in U.S. West Coast groundfish fisheries. The team used Bayesian time-series models, which have been shown to provide better precision and more stable inter-annual estimates than ratio estimators, to estimate Black-footed Albatross (*Phoebastria nigripes*) bycatch in the U.S. West Coast (Washington, Oregon, California) demersal longline fishery targeting sablefish (*Anoplopoma fimbria*). Results from this work are being prepared for presentations and a publication.

OREGON

Researchers from Oregon State University (OSU) and cooperators continued to study interactions between seabirds and forage fish in the Pacific Northwest in 2019. This year, research and monitoring was focused on the Caspian Tern (*Hydroprogne caspia*) colony at East Sand Island in the Columbia River estuary. Investigations into the effects of avian predation on survival of juvenile salmonids (*Oncorhynchus spp.*) in the Columbia River basin were a continuing emphasis of this research. Management by the U.S. Army Corps of Engineers and their cooperators continued to limit Caspian Tern nesting habitat at East Sand Island to 0.4 hectares (1 acre) as part of efforts to reduce Caspian Tern predation on threatened and endangered Columbia River salmonid populations. The research team monitored the response of terns to this management using a combination of banded tern resighting, identification of forage fish prey types, unmanned aerial vehicle photography of the East Sand Island tern colony, and aerial surveys of other potential nesting sites within the region. In 2019, because of competition for nesting territories with Glaucous-winged/Western Gulls (*Larus glaucescens* x *L.*

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occidentalis), Caspian Terns occupied only 0.35 hectares (0.86 acres) of the prepared colony area at East Sand Island. The research team estimated the size of the tern colony within the 0.35 hectares at about 3,800 breeding pair; nesting success was fair to poor, despite hundreds of young terns being fledged. The research team included **Dan Roby** (Professor – retired, OSU), **Tim Lawes** (Senior Faculty Research Assistant, OSU), **Olivia Bailey** (Field Crew Leader, OSU), **Kirsten Bixler** (Faculty Research Assistant, OSU), **Don Lyons** (Assistant Professor–Senior Research, OSU; Director of Conservation Science, Seabird Restoration Program, National Audubon Society), **Adam Peck-Richardson** (Research Associate, OSU), and **Emily Scott** (Seasonal Field Technician, OSU). The Bonneville Power Administration and U.S. Fish and Wildlife Service provided funding.

Dan Roby and **Tim Lawes** collected aerial photography and provided colony size enumeration from aerial imagery for colony locations in interior Oregon and Washington of Double-crested Cormorants (*Phalacrocorax auritus*) in 2019. This work contributed to the

efforts to complete the Monitoring Strategy for the Western Population of Double-crested Cormorants within the Pacific Flyway for 2019. The Oregon Department of Fish and Wildlife and the Washington Department of Fish and Wildlife provided funding.

The Oregon Marbled Murrelet Project, led by OSU, continued their research on Marbled Murrelet (*Brachyramphus marmoratus*) space use along the central Oregon Coast. In 2019, 46 murrelets were captured and deployed with Very High Frequency (VHF) telemetry tags and four active nests were found (two successful, two failed). To date, 190 adult murrelets have been captured and marked during the 2017-2019 breeding seasons and 12 active nests have been located (no birds nested in 2017). Research focuses on exploring breeding season movements and marine space use, looking at the synergistic effects of nesting habitat loss and changing ocean conditions on murrelet occupancy, and determining inland habitat characteristics at a variety of spatial scales. In addition, customized digital video cameras are being used to provide around-the-clock surveillance

of nests to determine chick provisioning rates and diet. This work is supported by funding from the Institute for Working Forest Landscapes within the College of Forestry at OSU and the U.S. Department of Agriculture National Institute of Food and Agriculture, McIntire Stennis project 1014995. The project principle investigators are **Jim Rivers**, **Kim Nelson**, **Dan Roby**, and **Matt Betts**. Research assistants are **Lindsay Adrean**, **Ethan Woodis**, and **Jon Dauchenhaus**. The project is managed by **Jenn Bailey-Guerrero** and assisted by a post-doc, **Sophie Garcia-Heras**. A field crew of 10-15 technicians s helped collect field data.

2019 was the 13th consecutive year of monitoring at the Yaquina Head colony in Newport, Oregon. **Jessica Porquez** (Faculty Research Assistant, OSU), **Robert Vargas** (Environment for the Americas Intern), **Cassidy Turner** (OSU undergraduate, URSA Engage Intern), **Jane Dolliver** (MSc Student, OSU), and **Rachael Orben** (Assistant Professor, Senior Research, OSU) monitored nesting Common Murres (*Uria aalge*) and Pelagic and Brandt's Cormorants (*Phalacrocorax*



Laysan Albatrosses. Photo credit: David Pereksta

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pelagicus and *P. penicillatus*). In 2019, higher hatching rates (0.69) of Common Murres and comparable fledging rates (0.79 of hatched eggs) to 2018 marked a second year of higher reproductive success following sustained years of near failure (2015-2017). The median hatch date (July 9) was later than the long-term mean. Predator disturbances (primarily Bald Eagle, *Haliaeetus leucophalus*) at the colony were the lowest in 2019 in ten years. Disturbance events at one sub-colony (Flat Top Rock) however, led to abandonment of the rock, a response that monitors have consistently observed from 2013-2019. Both Brandt's and Pelagic Cormorants had high chick fledging rates (1.89 and 2.36 fledglings/nest, respectively). The median hatch date for both species was slightly earlier than the long-term mean (LTM); Brandt's Cormorants began hatching July 5 (LTM: July 9), and Pelagic Cormorants on July 10 (LTM: July 15).

Ray Martin (OSU Undergraduate) and **Rachael Orben** monitored Western Gulls (*Larus occidentalis*) at the Cleft-in-the-Rock colony south of Yachats, Oregon, at the Yaquina Head colony, and on various buildings in Newport, Oregon. This year the colony at Cleft-in-the-Rock failed due to eagle predation. **Ray** piloted the use of trail cameras to monitor nest attendance by Western Gulls. This effort was funded by the PSG Student Research Grant.

Jason Piasecki (OSU undergraduate) continued research on marine plastics accumulation by analyzing stomach contents of beached birds along the central Oregon coast. Methodology was developed to assess the buoyancy of plastic particles. Both diving and surface foraging birds were found to have ingested both negatively and positively buoyant plastic particles, suggesting that forage fish may be a source of plastics. Results were presented at Hatfield Marine Science Center and the 2018 Pacific Estuarine Research Society conference.

Jason Piasecki, Adam Peck-Richardson, and Rachael Orben

installed two nest boxes for Pigeon Guillemots (*Cepphus columba*) underneath the ship operations dock at the Hatfield Marine Science Center for education, outreach, and research purposes for the fourth year. This year three chicks fledged. A live feed was available (<http://webcam.oregonstate.edu/pigu>).

Adam Peck-Richardson, Rachael Orben, and Don Lyons completed the first full year of an interdisciplinary project using novel biologging tags on diving seabirds (*Phalacrocorax spp.*) to collect oceanographic data. In 2019, Brandt's and Pelagic Cormorants were captured in the Columbia River estuary and fitted with integrated Global Positioning System - Global System for Mobile Communications tags (GPS-GSM) to measure pressure (depth), temperature, and inertial motions (acceleration and compass bearing). **Jim Lerczak** (Professor, OSU), **Greg Wilson** (Assistant Professor, OSU), **Tuba Ozkan-Haller** (Associate Vice President for Research Administration and Development, OSU), **Doruk Ardag** (Postdoc, OSU), and **Dylan Winters** (Faculty Research Assistant, OSU) are processing bird-derived data to describe water column properties, surface gravity waves, currents, and bathymetry and to calibrate satellite derived oceanographic models. Planning began for future biologging work with Pelagic Cormorants at Middleton Island, Alaska, and Socotra Cormorants (*Phalacrocorax nigrogularus*) in the United Arab Emirates. This effort is funded by the Office of Naval Research.

Jane Dolliver with major advisor **Rob Suryan** (OSU) and collaborators **Chris Noyles** (BLM), **Leah Kenney** (U.S. Fish and Wildlife Service [USFWS]), **Beth Flint**, **Jenny Johnson** (USFWS), **Lindsay Young** (Pacific Rim Conservation), and **Hiroshi Hasegawa** (Toho University), completed her thesis, "Using Satellite Imagery to Count Nesting Albatross from Space." Short-tailed Albatross (*Phoebastria albatrus*) are identifiable on both WorldView-2 and WorldView-3 satellite platforms, but

the two smaller North Pacific species, Black-footed Albatross (*P. nigripes*) and Laysan Albatross (*P. immutabilis*) are only identifiable on the WorldView-3 platform. Panchromatic image counts can accurately model in-field counts when accounting for platform, species, and vegetation cover. Using the best-performing, panchromatic model the team estimated a colony of Short-tailed Albatross breeding in the Senkaku Islands has expanded to a minimum of 166 adult birds.

NORTHERN CALIFORNIA

Compiled by **Kirsten Lindquist**

In April 2019, the Marbled Murrelet Effectiveness Monitoring Program posted a summary report on the monitoring results from at-sea surveys for Marbled Murrelets (*Brachyramphus marmoratus*; MAMU), which occurred in nearshore waters in 2018. This and other program reports can be accessed online at: <https://www.fs.fed.us/r6/reo/monitoring/murrelet/>. In 2019, at-sea surveys were continued under this program in southern Oregon and northern California (from Coos Bay to the southern Humboldt County line) and were led by **Craig Strong** (Crescent Coastal Research). Details surrounding this work, including a project overview and the complete list of contributors, is included in the Washington & Oregon report above.

In addition to conducting marine monitoring surveys for the Northwest Forest Plan Marbled Murrelet population monitoring effort, **Craig Strong** monitored Pelagic and Brandt's Cormorant (*Phalacrocorax pelagicus* and *P. penicillatus*) colonies and generally tracked seabird nesting in northern California and southern Oregon (ca 40 to 43 degrees N on the U.S. west coast). The 2019 season was remarkable for over 90% nesting failure of both cormorant species, and over 97% failure for Common Murres (*Uria aalge*) in this region. Where

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birds attended colonies at reduced numbers and laid eggs into June, very few cormorants fledged chicks (none in monitored plots), and the proportion of chicks in at-sea Common Murre counts in July was 0.0018 (n=1650; the mean of 2000-2015 was 0.190). This is the second widespread seabird failure in this region in the last three years, and was worse for both cormorants than the 2017 season, which was affected by the 2015-2016 marine heat wave (Di Lorenzo and Mantua. 2016. *Nature Climate Change* 6: 1-7.). No ready explanation for the poor conditions has surfaced; however, lag effects from the marine heat wave on higher trophic levels and ongoing anomalies are possible contributing factors.

Humboldt Redwood Company, LLC (HRC) continued the conservation activities for the Marbled Murrelet under the company's Habitat Conservation Plan (HCP). Project leaders were **Sal Chinnici** and **Mark Freitas** of HRC. The HCP requires tracking of murrelet occupancy and numbers over time using both radar and audio-visual (AV) survey techniques. Surveys were continued in 2019 at the Headwaters Forest Reserve and Humboldt Redwoods State Park (the Reserves), and also at the Marbled Murrelet Conservation Areas (MMCAs) on HRC forestlands, with the collaboration of **Sean McAllister** (O'Brien Biological Consulting) and **Adam Brown**.

Since the inception of HCP monitoring (1999), occupied behaviors have been observed in the MMCAs and Reserve stands using AV surveys. In 2019, surveyors conducted 141 surveys at 33 stations and observed occupied behaviors (below canopy flight or circling) in the Headwaters Forest Reserve, Humboldt Redwoods State Park, and the Allen Creek, Bell Lawrence, and Cooper Mill MMCAs.

Radar surveys track murrelets traveling to and from nesting areas within the MMCAs and Reserves. Radar counts are considered indices of the breeding population. In 2019, 56 radar surveys were conducted at 14 sites.

Most murrelets tracked by radar were at Humboldt Redwoods State Park and the Cooper Mill MMCA. Final analyses of the 2019 data have not yet been conducted. The 2018 data indicated that after 16 years of monitoring, trends in radar counts of murrelets in the MMCAs and Reserves have differed during the study period; there has been a decline in radar counts in both the Reserves and the MMCAs since the 2002 baseline, but the decline in radar counts in MMCAs has been smaller.

Claire Nasr (Bureau of Land Management, Humboldt State University [HSU]) and **Daniel Barton** (HSU) continued field monitoring efforts of nesting success and habitat use of nearshore seabirds around Trinidad Head and Patrick's Point for the seventh consecutive year, in collaboration with the Trinidad Chapter of the Seabird Protection Network (SPN) and Trinidad Coastal Land Trust. **Claire Nasr** completed an HSU MSc thesis on methodology for and application of seabird spatial disturbance risk modeling. **Daniel Barton** continued work monitoring seabirds in the region using unmanned aerial vehicles to estimate abundance and change in abundance over time at colonies in the Humboldt Bay and Trinidad area. They observed near-complete reproductive failure of Common Murre at the Trinidad Complex, one of the largest complexes of murre colonies in the state, in early June 2019, the cause of which was unclear. This observation was corroborated by minimal observations of murre checks at sea in the region during June and July. The monitoring efforts at these site intersects with a citizen scientist project coordinated by the SPN, and compliments outreach efforts by the SPN to reduce seabird disturbance risk at these sites, now in its third year. Principal species monitored by these projects include cormorants (three *Phalacrocorax spp.*), Western Gull (*Larus occidentalis*), Pigeon Guillemot (*Cephus columba*), and Common Murre. **Rebecca Garwood**, **Justin Garwood**, **James Ray** (all

with California Department of Fish and Wildlife), and **Daniel Barton** continued an ongoing Double-crested Cormorant (*Phalacrocorax auritus*) and Caspian Tern (*Hydroprogne caspia*) diet study in Humboldt Bay into its third year, obtaining numerous pellets at local colonies as well as locating several thousand Passive Integrated Transponder tags from salmonid tagging efforts in local seabird colonies.

Mike Johns and **Pete Warzybok** (Point Blue Conservation Science) in coordination with **Gerry McChesney** (USFWS Farallon Islands National Wildlife Refuge) continued the long-term program monitoring the population size, reproductive success, and diet for 13 species of breeding seabirds. 2019 was a very poor breeding year for most species. A moderate El Niño that developed during the previous winter persisted into the breeding season leading to anomalously warm sea surface temperatures, late season storms, reduced upwelling, and overall low ocean productivity around the islands. The planktivorous Cassin's Auklets (*Ptychoramphus aleuticus*), which had been experiencing above average productivity for the past 10 years, had their lowest breeding success since 2006 with fewer than 10% of sites successfully fledging a chick. Cassin's also bred nearly a full month later than last season and three weeks later than the long-term median laying date. The majority of breeding attempts were subsequently abandoned. Likewise, Common Murre productivity was greatly reduced this season with the lowest productivity since 2009 and the fourth lowest on record for this colony. There was both reduced breeding effort and reduced chick survival observed relative to previous years. Rhinoceros Auklets (*Cerorhinca monocerata*), Pigeon Guillemots, and Western Gulls also had reduced breeding success in 2019 when compared to last season and to the long-term mean productivity for these species. Pelagic Cormorants were present around the island throughout the season but very

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few pairs attempted to breed and no chicks fledged from followed nests. In contrast, Brandt's Cormorant breeding success, though slightly reduced compared to last season, was above average for the seventh consecutive year. The California Gull (*Larus californicus*) population continues to decline on Southeast Farallon Island, with only 9 likely nests observed, one of which contained eggs. No chicks were observed in 2019. Northern anchovy (*Engraulis mordax*) were by far the most dominant prey item in chick diet for Common Murres and Rhinoceros Auklets. Juvenile rockfish (*Sebastes spp.*) were virtually absent with the lowest abundance observed in chick diet since 2006/2007. Overall ocean productivity appeared to be poor for much of the season with clear blue water observed around the island and very little krill in the auklet diet. Canada Geese (*Branta canadensis*) nested on the Farallones for the ninth consecutive year and fledged several chicks from at least four nests. In addition to regular monitoring work, this was the fifth season of geolocator deployments on Cassin's Auklets, third season on Pigeon Guillemots, and second season on Rhinoceros Auklets in an effort to better understand the winter dispersal patterns of alcids from the Farallones. They also continued Global Positioning System (GPS) tracking studies on Rhinoceros Auklets, Western Gulls, and now Common Murres during the chick rearing period to examine interannual changes in their foraging behavior.

2019 marks the 26th year of Beach Watch, the coastal monitoring program of Greater Farallones National Marine Sanctuary (GFNMS) and Greater Farallones Association. In 2019, Beach Watch monitored 62 survey sites over five counties in North Central California. 2019 was largely a quiet year for seabird and marine mammal mortality in central California. One notable exception, Common Murre deposition was atypically high in April-July, with two peaks of deposition in April (157%) and June (157%) higher

than the long-term mean (1993-2018) for these months. During the months of April and May, murres were aged: 88% of birds were adult, 5% second year, and 7% unknown (n=201). Post breeding mortality in August-November was 48% of the long-term mean, and young of the year were almost completely absent. Contact **Kirsten Lindquist** (Greater Farallones Association in contract with the National Oceanic and Atmospheric Administration [NOAA]), [KLindquist \[at\] farallones \[dot\] org](mailto:KLindquist@farallones.org) or **Jan Roletto** (NOAA GFNMS) [Jan.Roletto \[at\] noaa \[dot\] gov](mailto:Jan.Roletto@noaa.gov) for access to Beach Watch data.

2019 marks the 16th field sampling season of the Applied California Current Ecosystem Studies (ACCESS; www.accessoceans.org) surveys. ACCESS is a collaborative effort of Cordell Bank National Marine Sanctuary, Greater Farallones National Marine Sanctuary, and Point Blue Conservation Science for ongoing data collection to understand status and trends of sanctuary resources, ecosystem health, and response to climate change. Scientists collect seabird and marine mammal data, oceanographic measurements, marine debris, and sample for prey availability along predetermined transect lines.

This year, spring upwelling conditions made for rough seas and multiple delays but good ocean productivity indicated by abundant zooplankton and whales. Most notable were abundant krill (*Euphausia spp.*) in both Tucker trawls and some hoop net tows. There were a fair number of humpback whales (*Megaptera novaeangliae*) foraging along the shelf break and over the continental shelf. Scientists also collected data on the locations of Dungeness crab (*Metacarcinus magister*) pot buoys, a commercial fishery that closed early this year due to increased risk of whale entanglements. ACCESS data are provided to the Dungeness Crab Fishing Gear Working Group to inform the Risk Assessment and Mitigation Program to look at risk to humpback whales and locations of out of season commercial gear.

During the July cruise, during peak upwelling, they observed high levels of phytoplankton, zooplankton and krill in the prey samples. Humpback whales were observed throughout the region and across the shipping lanes. No blue whales (*Balaenoptera musculus*) were observed during this cruise, which is somewhat uncommon. They observed lower than average numbers of Common Murres with chicks.

During the fall cruise, they found typical oceanographic conditions and productivity, with scattered bait balls of krill and fish, copepods and gelatinous invertebrates. Humpback and blue whales were distributed mostly along the 200-meter isobath, and some humpbacks were obviously feeding on small schooling fish across the shelf. There were surprisingly high numbers of Arctic Terns (*Sterna paradisaea*), Sabine's Gulls (*Xema sabini*), South Polar Skua (*Stercorarius maccormicki*), and various jaegers (*Stercorarius spp.*) throughout the sanctuaries. For more information, contact the principal investigators, **Jaime Jahncke** (Point Blue Conservation Science) [jjahncke \[at\] pointblue \[dot\] org](mailto:jjahncke@pointblue.org), **Dani Lipski** (NOAA Cordell Bank National Marine Sanctuary) [Danielle.lipski \[at\] noaa \[dot\] gov](mailto:Danielle.lipski@noaa.gov), or **Jan Roletto**, [Jan.Roletto \[at\] noaa \[dot\] gov](mailto:Jan.Roletto@noaa.gov).

Farallon Institute (FI) conducted at-sea seabird surveys seasonally as part of the California Cooperative Oceanic Fisheries Investigation (CalCOFI), California Current Ecosystem - Long-term Ecological Research (CCE-LTER), and Southern California Coastal Ocean Observing System (SCCOOS) programs. These cruises take place in the Southern California Bight and along the Central California Coast. For each cruise, a seabird observer is stationed on the bridge of the ship and records the number and species of birds they see. The data software records the geographic position of the ship for each seabird observation and can analyze seabird density by location. Initiated by other agencies, Farallon Institute has been responsible for this surveying

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Roseate Tern. Photo credit: David Pereksta

since 2008; full time series extend back to 1987.

FI also conducted at-sea seabird surveys annually on the National Marine Fisheries Service (NMFS) Rockfish Recruitment and Ecosystem Assessment Survey (RREAS) off the central-northern California coast and extending up the Oregon coast. Time series extend back to 1996, and FI observers have done the surveys since 2008. Survey methods are the same as for the Southern California observations.

Susan Euing (USFWS employee and contractor to Department of Veterans' Affairs [VA]) and **Taylor Pantiga** (USFWS intern) monitored the nesting colonies of three tern species at VA Alameda Point in Alameda, California, (the former Naval Air Station Alameda): California Least Terns (*Sternula antillarum browni*; LETE), Caspian Terns (CATE) and Elegant Terns (*Thalasseus elegans*; ELTE). **Susan** led seven volunteer work parties from September 2018 through April 2019, clearing weeds and preparing the nesting sites prior to the nesting seasons for these species.

Meredith Elliott and **Rachel Banuelos** (Point Blue scientist and intern, respectively) assisted USFWS twice weekly with walking-in-colony surveys of the LETE colony for the May

to August nesting season. In addition, **Susan** conducted observations from a vehicle blind outside the colony using scope and binoculars 4 days/week to track nest activity and predator presence. The first California Least Tern in 2019 was seen at VA Alameda Point on April 17. Although the first LETEs arrived on time, the bulk of the LETEs did not arrive and begin nesting until the first week of June, at least 3 weeks later than in prior years. The first LETE nest was discovered on June 4, and the first chicks hatched on June 29. The first fledgling was observed on July 19. The last LETE observed on VA Alameda Point was on August 27. This year's breeding season experienced fairly low predation (18 LETEs and 2 eggs) mostly by Peregrine Falcons (*Falco peregrinus*), high chick mortality (33%), and 23% nest failure. However, the nest hatching rate was 77% and surviving fledgling rate was 43%, compared to 74% and 44%, respectively, from 2018.

Despite 2019's shorter nesting season, (12 weeks vs. 15 weeks in 2018), the productivity numbers were very similar between 2019 and 2018: number of breeding pairs (311 vs. 314 in 2018), minimum number of fledglings (182 vs. 190 in 2018) and fledgling-to-breeding pair ratio (0.544 vs. 0.595 in 2018). There are two on-going studies at the

LETE colony: a diet study using both collected dropped fish and pellets, and a provisioning study using camera traps.

Caspian Terns were first observed at VA Alameda Point in late February 2019. First nests were observed on April 22, and the highest number of CATE nests (581) was counted on May 14, the same day the first chicks were observed. The highest number of live chicks counted while inside the colony was 245 on May 28. Nesting observations were made during walking-in-colony surveys within the CATE colony for only part of the breeding season (April 24 to May 31). The remaining observations were made from a vehicle blind at a distance and using scope and binoculars to minimize disturbance. Unfortunately, fast growing invasive plants disrupted much of the view into the colony for the remainder of the season. They estimated 500 to 600 CATEs attended this colony. A minimum of 98 fledglings were observed on July 18, but this number is expected to be low. This was the fifth year in a row for the CATEs to nest at VA Alameda Point.

On May 1, 50-60 Elegant Terns were observed flying around and landing within the CATE colony. A walk-through survey confirmed the first ELTE nest that day. This was the first time for ELTEs to nest at VA Alameda Point and possibly on San Francisco Bay. On May 22, there were 240 nests and 5 live chicks. They had to cease entering the CATE-ELTE colony after May 31 to minimize disturbance. On July 27, 1,832 ELTEs were counted, of which 31 were young of the year. At least 72 chicks/fledglings were counted on July 18, but this number is expected to be low due to poor visibility from invasive plant encroachment. CATEs and ELTEs were last seen at this property on August 30 and September 5, respectively.

Mark Rauzon (Marine Endeavors) has joined with marine engineering firm Moffitt Michols to conduct a feasibility study to determine if the old Berkeley Pier can support artificial nesting platforms. This project is funded with penalty fines stemming from the 2007

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Cosco Busan oil spill. **Mark** is also writing a book about the Bering Sea climate chaos likely to be published by University of Washington Press. Research for the book took him to the Russian Far East in summer 2018 where few seabirds were noted breeding. Notably however, he photographed an unbanded Short-tailed Albatross (*Phoebastria albatrus*), suggesting it came from the off-limits Senkaku Islands.

David Ainley, and collaborators recently finished analysis of all the at-sea aerial and ship-board survey data that have been collected off California, 1980-2017 (497,000 km), as well as reports from more than 1,000 “birder” pelagic trips during the same time period, to derive a report titled “At-sea distribution patterns and population size of the Ashy Storm-petrel *Oceanodroma homochroa* (with contributions from **R. Glenn Ford, Scott Terrill, Margot Tollefson, Janet Casey, Debi Shearwater, Linda Terrill, David G. Ainley**) and plan to submit the report, and data analysis (funded by National Fish and Wildlife Foundation) to Marine Ornithology.

The Common Murre Restoration Project completed its 24th season of monitoring as part of a program to restore Common Murre colonies damaged by oil spills, led by principal investigators **Gerry McChesney** (USFWS) and **Richard Golightly** (HSU) with funding from the Luckenbach Oil Spill Trustee Council. The project monitors productivity, breeding population size, and disturbance to Common Murres as well as Brandt’s Cormorants, Pelagic Cormorants, Western Gulls, Black Oystercatchers (*Haematopus bachmani*) and Pigeon Guillemots. Monitoring took place at three central California coast colonies: Point Reyes Headlands (PRH), Devil’s Slide Rock & Mainland (DSRM), and the Castle-Hurricane Colony Complex (CHCC). Biologists **Cassie Bednar, Shannon Carvey, Amy Wilson**, and **Derek Harvey** along with field technicians **Emily Schmidt** and **Aspen Ellis** (HSU) conducted field observations throughout the breeding

season, from mid-April to mid-August.

In 2019, productivity values (chicks fledged per pair) for Common Murres were among the lowest recorded at PRH and DSRM but were similar to the long-term average at CHCC. Murre breeding site attendance was generally low and unusually large numbers of birds skipped breeding. Productivity was also below the long-term averages for Pelagic Cormorant and Western Gulls at DSRM and CHCC. Brandt’s Cormorant productivity was near average at PRH and DSRM but below average at CHCC. Numbers of Brandt’s Cormorant nests appeared to be greater in 2019 than in 2018 at PRH and DSRM, and similar to 2018 at CHCC. Disturbance to seabirds from human sources were from primarily aircraft.

2019 marked the 27th consecutive year of seabird monitoring at Año Nuevo Island, located 1 km off the coast in San Mateo County, California. Oikonos Ecosystem Knowledge’s **Ryan Carle** and **Jessie Beck** (Project Managers), **Rozy Bathrick** (Project Ecologist), **Sierra Kohls** and **Kelly Goedde-Matthews** (Seasonal Interns), and **David Calleri** (Project Volunteer) monitored breeding populations and productivity of Rhinoceros Auklets, Cassin’s Auklets, Pelagic Cormorants (island

and mainland), Brandt’s Cormorants, Pigeon Guillemots, Western Gulls, and Black Oystercatchers during weekly visits to the island.

Breeding Rhinoceros and Cassin’s Auklet populations continued to rise, consistent with the general pattern over the past 9 years of restoration efforts. Rhinoceros Auklet productivity was slightly above average. Cassin’s Auklets had a particularly poor year with almost total egg abandonment, and not a single fledged chick in the study subsample. This suggests poor foraging conditions and reduced krill availability in the area. The annual Rhinoceros Auklet diet study shows a continued reliance on young Northern Anchovy (*Engaululis mordax*), with a slight increase in incidence of juvenile salmon spp. (*Oncorhynchus* spp.).

In fall 2019, Oikonos continued restoration efforts on the island, installing erosion control material and 25 habitat enhancement platforms over fragile auklet burrows, intended to mitigate burrow erosion and damage from thousands of roosting Brown Pelicans (*Pelicanus occidentalis*). Oikonos continued collaboration with **Nathan Lynch** of California College of the Arts in the design and deployment of artificial ceramic nests, built to provide



Pink-footed Shearwater. Photo credit: David Pereksta

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erosion-proof burrows for Rhinoceros and Cassin's Auklets.

Corinne Gible (California Department of Fish and Wildlife, Office of Spill Prevention and Response, Marine Wildlife Veterinary Care and Research Center [CDFW/OSPR/MWVCRC] in Santa Cruz, CA) continues to monitor the morbidity and mortality of seabirds in California through systematic necropsy. In 2019, she investigated 2 notably large mortality events in California and worked with several collaborators including **Richard Grewelle** (PhD Candidate, Stanford University), who is examining Acanthocephalan parasite infections in seabirds and sea otters.

Josh Adams, Emma Kelsey, Cheryl Horton, and Laney White (U.S. Geological Survey [USGS]), with observer support from **Alex Rinkert** (California State Parks) conducted at-sea Marbled Murrelet surveys in Conservation Zone 6 in Central California to estimate abundance and juvenile ratios for murrelets in 2019. This project was funded by the Luckenbach Oil Spill Trustee Council. **Jonathan Felis** (USGS), **Josh Adams**, and **Emma Kelsey** are preparing an annual report for 2019 surveys and have published the findings from 2018 murrelet surveys as part of their data series publication and data release for this project:

1. Felis JJ, EC Kelsey, J Adams. 2019. Abundance and productivity of marbled murrelets (*Brachyramphus marmoratus*) off central California during the 2018 breeding season. U.S.G.S. Data Series 1107, 12 p.
2. Felis, J.J., Adams, J., Peery, M.Z., Henry, R.W., Henkel, L.A., Becker, B.H., and Halbert, P., 2019, Annual marbled murrelet abundance and productivity surveys off central California (Zone 6), 1999-2018 (ver. 2.0, March 2019): U.S. Geological Survey data release, <https://doi.org/10.5066/F75B01RW>.

Josh Adams and **Jonathan Felis** continued to work with **Jefferey Leirness** (NOAA Biogeography Branch), **Lisa**

Ballance (NOAA Southwest Fisheries Science Center and Marine Mammal Institute, Oregon State University), **Trevor Joyce** (NOAA Southwest Fisheries Science Center), and **Dave Pereksta** (Bureau of Ocean Energy Management [BOEM]) to procure and process seabird survey datasets to model at-sea density of marine birds to support renewable energy planning on the U.S. Pacific outer continental shelf off the western U.S. (California Current Region).

Scott Shaffer and students **Cole Jower** and **Sean Gee** (San Jose State University), are continuing research with **Pete Warzybok, Mike Johns,** and **Jamie Jahncke** of Point Blue Conservation Science at the Farallon Islands to examine the foraging and breeding ecology of Western Gulls, Rhinoceros Auklets, and Common Murres. **Scott** and his student **Anqi Chen** are collaborating with **Josh Ackerman** (USGS) to examine the foraging ecology of California Gulls in San Francisco Bay.

SOUTHERN CALIFORNIA

Compiled by **Cristián Suazo**

Jeff Davis, Phil Capitolo, Dave Lewis, Peter Gaede, Mike Parker, and **Glenn Ford** (all University of California, Santa Cruz [UCSC]; **Jeff Davis**, Principal Investigator) continued conducting aerial surveys of marine birds and mammals in California continental shelf waters under contract with California Department of Fish and Wildlife Office of Spill Prevention and Response (CDFW-OSPR) **Holly Gellerman**. The surveys are designed to collect baseline distribution and abundance data and to maintain rapid-response capabilities for oil spills. During the past year, surveys were conducted in the Santa Barbara Channel and throughout the nearshore zone of Southern California.

Sarah Thomsen is a postdoctoral

scholar in the department of Integrative Biology at OSU working with **Rebecca Terry**. Sarah is researching ecosystem change in the California Current over the last ~1,500 years via stable isotope analysis of seabird skeletal remains (mostly Cassin's Auklet [*Ptychoramphus aleuticus*] and Scripps's Murrelet [*Synthliboramphus scrippsi*]) collected from a sea cave site on Santa Barbara Island, Channel Islands National Park.

Josh Adams, Emma Kelsey, Amelia DuVall (U.S. Geological Survey [USGS]/California Institute of Environmental Studies), **David Mazurkiewicz** (Channel Island National Park), **Matthew McKown, Jeff Schlueter,** and **Kerry Dunleavy** (Conservation Metrics Inc.) are compiling and comparing mistnetting and acoustic analyses for Ashy Storm-petrels (*Oceanodroma homochroa*) within the California Channel Islands 1994 - 2018. Funding was provided by the National Fish and Wildlife Foundation.

Josh Adams, Jonathan Felis (USGS), and **Emma Kelsey**, in collaboration with **Bill Standley** (Bureau of Land Management [BLM] California Coastal National Monument), **Matthew McKown, Jeff Schlueter,** and **Kerry Dunleavy** are finalizing their analysis of acoustic presence and distribution of storm-petrel species on 30 rocks and islands off the California coast (primarily within the California Coastal National Monument). Funding was provided by BLM and the National Fish and Wildlife Foundation. The final report will be published December 2019.

Josh Adams, Laney White, Amelia DuVall, and **Cheryl Horton** (USGS), in collaboration with **Matthew McKown, Jeff Schlueter,** and **Abram Fleishman** (Conservation Metrics Inc.), and support from **Dave Pereksta** (Bureau of Ocean Energy Management), continue aerial photographic surveys of seabirds and marine mammals off Southern California, while developing machine learning methods to process, extract and classify objects in images.

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HAWAI'I

Compiled by Cristián Suazo

At Midway Atoll National Wildlife Refuge (MANWR), U.S. Fish and Wildlife Service (USFWS) staff, volunteers, and collaborators continued to monitor populations of three species of albatross. Under the direction of **Roberta Swift** (USFWS) and **Beth Flint** (USFWS), and in collaboration with **Bill Kendall** (U.S. Geological Survey [USGS]) and Bird Banding Lab staff, **Jonathan Plissner** (Island Conservation) and other Midway personnel contributed to the completion of a 14th consecutive year of the long-term Albatross Demographic Monitoring Project for the Hawaiian Islands and finished an extensive quality review of survivorship data for all years of the project. Results of the 2018-2019 breeding season included the lowest reproductive success for Laysan Albatross (*Phoebastria immutabilis*) recorded to date for the project; although Black-footed Albatross (*Phoebastria nigripes*) reproductive success was near the average rate for the same time period. **Rachael Orben** (Oregon State University) and **Melinda Connors** (Stony Brook University), in collaboration with **Scott Shaffer** (San Jose State University) and **Lesley Thorne** (Stony Brook University), returned to Midway in 2019 to continue monitoring of foraging ecology and physiology of albatross using Global Positioning System (GPS) and accelerometer dataloggers. During the season, MANWR staff also monitored nesting of the first Short-tailed Albatross (*Phoebastria albatrus*) pair to produce a chick on Sand Island. The chick was banded and subsequently fledged in late May 2019.

Preparations also continued for a large-scale Midway Seabird Protection Project, focusing on eradication of house mice (*Mus musculus*) from Sand Island, with implementation planned for summer 2020. **Beth Flint**, **Jonathan Plissner**, and **Coral Wolf**

(Island Conservation) completed a second year of baseline population monitoring for several seabird species (as well as other native and invasive plants and animals) in order to assess impacts of the mouse eradication. In addition to the albatross demographic monitoring and in collaboration with Conservation Metrics, they assessed acoustic activity of Tristram's Storm-petrels (*Oceanodroma tristrami*) and Bulwer's Petrels (*Bulweria bulwerii*) on both Sand Island and Eastern Island. Tristram's Storm-petrels were found nesting at several sites on both islands; but Bulwer's Petrels do not appear to have re-established breeding populations at Midway. A single bird was heard calling from a burrow over several nights in July. Although no evidence of nesting was found, it was the first Bulwer's Petrel detected on Midway since 2009 and offers hope for the species to eventually return to a rodent-free atoll.

Lindsay Young, **Eric VanderWerf**, and **Robby Kohley** from Pacific Rim Conservation (PRC) have continued to expand upon their "no net loss" program where the goal is to create equal amounts of predator-free high island habitat to match what is currently being lost to erosion and sea level rise in the Northwestern Hawaiian Islands. In 2019, 25 Black-footed Albatrosses (BFAL), 78 Bonin Petrels (*Pterodroma hypoleuca*, BOPE), and 42 Tristram's Storm-petrel (TRSP) chicks from Papahānaumokuākea Marine National Monument were translocated by ship and plane to James Campbell National Wildlife Refuge on O'ahu. The birds were placed in a predator exclusion fence where the PRC team of biologists raised them on a diet of fish and squid slurry, and closely monitored their health and growth. Fledging success was 95% (138/145) overall, including 100% for BFAL (25/25), 97% for BOPE (76/78) and 88% for TRSP. This is the third year of BFAL translocations at this site and the second year of BOPE and TRSP translocations. Three years of Laysan Albatross (LAAL) translocations took

place at this site from 2015-2017, and the first returning translocated chick, raised in 2015, has been returning to the predator exclusion fence for the past two years. PRC continues to do a variety of seabird monitoring surveys across Hawai'i and the Pacific as well as working on the critically endangered Newell's Shearwater (*Puffinus newelli*) and endangered Hawaiian Petrel (*Pterodroma sandwichensis*) translocations on Kaua'i which are in their 5th year (visit www.nihoku.org for details).

Andre F. Rainé, **Jennifer Rothe**, **Scott Driskill**, and the rest of the team from the Kaua'i Endangered Seabird Recovery Project (KESRP) continued a number of long-running conservation and research programs on the island of Kaua'i, focused on the three endangered seabirds breeding on the island: Newell's Shearwater, Hawaiian Petrel, and Band-rumped Storm-petrel (*Oceanodroma castro*). Seabird monitoring continued at Upper Limahuli Preserve, Upper Manoa Valley and five sites in Hono O Na Pali Natural Area Reserve, to assess the effectiveness of cat, rat, pig, and introduced Barn Owl (*Tyto alba*) control. The results at the end of the 2018 breeding season continued to show increasing reproductive success rates and call rates across most sites, highlighting the positive effects of seabird management in these areas. A translocation project for Newell's Shearwater and Hawaiian Petrel continued for the fifth year in 2019, with 20 Newell's Shearwater and 20 Hawaiian Petrel being translocated from mountain colonies to the predator-proof fence at Nihokū (Kīlauea Point National Wildlife Refuge) as part of a multi-partner project including KESRP, Pacific Rim Conservation, American Bird Conservancy, National Fish and Wildlife Foundation, U.S. Fish and Wildlife Service, State of Hawai'i's Department of Land and Natural Resources (DLNR), Pacific Studies Co-operative Unit, and National Tropical Botanical Garden. With this year's chicks, a total of 90 Hawaiian Petrel and 65 Newell's Shearwater have now been

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translocated since 2015.

KESRP also carried out seabird monitoring on Moku'ae'ae Islet and Lehua Islet. In the case of Lehua Islet the main focus is on seabird monitoring related to the on-going rat eradication and ecosystem restoration project on the islet that was initiated in 2017. The dramatic reduction of rats on the islet has led to immediate responses from smaller seabird species nesting on Lehua, particularly Bulwer's Petrel. The project is run by the Hawai'i DLNR Division of Forestry and Wildlife (DOFAW), in conjunction with federal sponsor USFWS, technical partner Island Conservation (IC), and the cooperating members of the Lehua Island Restoration Steering Committee (LIRSC). In conjunction with **Rachel Sprague** and **Grazel Carceres** of Pulama Lana'i, KESRP has also continued in its fifth year of monitoring the Hawaiian Petrel colonies of the island of Lana'i, using a combination of song meters, burrow checks, auditory surveys, and burrow cameras. Reproductive success rates have improved dramatically on Lana'i since the initiation of a new predator control project by Pulama Lana'i. Data loggers were also deployed on breeding Hawaiian Petrels for the second year to chart overland flyways to and from colonies in the mountains; flyways in 2019 were the same as those found in 2018.

Song meters were deployed by KESRP at multiple sites along the ridges and slot canyons of the Na Pali coast. Call rates for Newell's Shearwater, Band-rumped Storm-petrel, and Barn Owl will be analyzed from these units to assess the effectiveness of Barn Owl control in the area. KESRP also continued its work at the Kokee Air Force Station (the site of a major fallout event of adult birds in 2015), monitoring the new lights at the site to assess potential attraction effects. As with the previous year, there was no fallout recorded. Lastly, KESRP reinitiated its long-term radar project, undertaking radar surveys for Newell's Shearwater and Hawaiian Petrel at 15 locations around Kaua'i to assess long-

term population trends for both species.

As part of KESRP's Underline Monitoring Project, **Marc Travers**, **Angela Stamen**, **Theresa Geelhoed**, **Adam Elzinga**, and **André F. Raine** continued to investigate seabird take through power line collisions on Kaua'i. Using acoustic monitoring of power line collisions, direct observations of seabird collisions and dead birds under wires, data collected indicate that power line collisions are the single greatest documented source of mortality for Newell's Shearwaters and Hawaiian Petrels on Kaua'i and are having population-level effects. Working with funding from the Kaua'i Island Utility Co-operative (KIUC), the team has been developing a number of ways to reduce these collisions, including the creation of laser fences at key collision hot spots (to create a visual barrier for birds to fly over power lines) as well as using bird diverters (including blinking LED Diverters), removal of the top power lines and the potential for relocation or realignment of existing lines. All three of these tools have now resulted in significant reductions in seabird collisions and are very promising avenues to pursue further. Lastly, they continue to promote the simple solution of maintaining or promoting tall trees on the landscape to force birds to fly up and over power lines. This last point is particularly important now that Kaua'i has a wood burning power plant that has greatly reduced standing tree height at low elevations, resulting in increased seabird power line collision risk in areas that were formerly estimated to have low risk.

Graduate student **Hannah Moon** (under the supervision of **Megan Porter** at the University of Hawai'i at Manoa on O'ahu) is studying the visual ecology of Hawai'i's endangered and threatened seabirds. She is using physiological and molecular techniques to investigate visual system differences among species, particularly in the Newell's Shearwater, Hawaiian Petrel, Wedge-tailed Shearwater (*Ardenna pacifica*), and White-tailed Tropicbird (*Phaethon*

lepturus). Her goal is to make species-specific models of vision to better understand juvenile light attraction behavior and seabird perception of the environment.

Peter Kappes (U.S. Department of Agriculture) is currently working as rodent island eradication biologist for the Wildlife Services' National Wildlife Research Center at the Hilo Field Station, where he is conducting feasibility studies for a proposed rat eradication on Wake Atoll, serving on the Lehua rat eradication steering committee, preparing environmental monitoring protocols for the upcoming mouse eradication on MANWR, and conducting research on controlling and eradicating invasive island predators.

Josh Adams, **Emma Kelsey**, **Jonathan Felis**, and **Laney White** (all USGS), in coordination with **Kim Uyehara**, **Heather Tonneson**, **Daniel Dewey** (Kilauea Point National Wildlife Refuge), **Thomas Ka'iakapu** (State of Hawai'i, DLNR, DoFAW), and **Jessica Behnke** (Pacific Missile Range Facility [PMRF]) with support from **David Pereksta** (Bureau of Ocean Energy Management [BOEM]), counted numbers of nesting Red-tailed Tropicbird (*Phaethon rubricauda*), White-tailed Tropicbird, Wedge-tailed Shearwater, and Red-footed Booby (*Sula sula*) at Kilauea Point National Wildlife Refuge. In addition, Wedge-tailed Shearwater nests were counted at PMRF and other state lands across Kaua'i.

Josh Adams, **Jonathan Felis**, and **Max Czapanskiy** (USGS), in collaboration with **David Pereksta**, are finalizing a report and data release on tracking of seabirds in the Main Hawaiian Islands to support renewable energy planning:

1. Adams, J, JJ Felis, M Czapanskiy. [In Press]. Habitat Affinities and At-Sea Ranging Behaviors among Main Hawaiian Island Seabirds: Breeding Seabird Telemetry, 2013–2016. Camarillo (CA) U.S. Dept. of the Interior, Bureau of Ocean Energy Management,

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Black Oystercatcher. Photo credit: David Pereksta

Pacific OCS Region. OCS Study BOEM 2019-051. 111 pp.

2. Felis JJ, M Czapanskiy, J Adams. [In Press]. At-sea ranging behavior of seabirds breeding in the main Hawaiian Islands: Bio-logger data release: U.S. Geological Survey data release, <https://doi.org/10.5066/P9NTEXM6>.

Josh Adams and **Emma Kelsey**, in collaboration with **Jay Penniman**, **Jenni Learned**, **Martin Frye** (Maui Nui Seabird Recovery Project), and **Rachel Sprague** (Pulama Lana'i) with support from **David Pereksta**, initiated boat-based visual and islet-based acoustic surveys of Lanai and Maui to inform a new seabird colony atlas of the Main Hawaiian Islands.

Scott Shaffer (San Jose State University) is continuing to study the foraging ecology of Laysan and Black-footed Albatrosses from Midway Atoll (in collaboration with **Lesley Thorne** of Stony Brook University and **Leigh Torres**, **Rachael Orben**, and **Rob Suryan** at Oregon State University).

NON-PACIFIC UNITED STATES

Compiled by **Mary Cody**

In July 2019, **Hannah Nevins**, **Holly Robertson**, and **Dan Lebbin** (American Bird Conservancy), **Jennifer Wheeler** (BirdsCaribbean), **Adam Brown** (Environmental Protection in the Caribbean), **Yvan Satgé** (Clemson University), and **Antoine Chabrolle** (Muséum National D'Histoire Naturelle), **Anderson Jean** (Jeunes en Action pour la Sauvegarde de l'Ecologie en Haiti [JACSEH]) convened an international stakeholder meeting for the Black-capped Petrel (*Pterodroma hasitata*) with 28 participants of 10 countries at the BirdsCaribbean Meeting in Guadeloupe. A special focus of the discussion was given to areas where petrels are suspected to be nesting, but yet to be confirmed within the Lesser Antilles: Guadeloupe, Martinique and Dominica. These notes are posted at: <https://www.birdscaribbean.org/our-work/black-capped-petrel-working-group/> along with other unpublished reports, notes, and presentations relating to the petrel.

LATIN AMERICA

Compiled by **Cristián Suazo**

In November 2019, a 3-day first international meeting for the

Conservation of the Galápagos Petrel (*Pterodroma phaeopygia*) was held in Puerto Ayora, Santa Cruz Island, Galapagos by Christian Sevilla of Galapagos National Park, **Gustavo Jiménez-Uzcátegui** of Charles Darwin Research Center, **Carolina Proaño**, and **Sebastian Cruz** of TierraMar, and **Hannah Nevins**, **Brad Keitt**, and **George Wallace** of American Bird Conservancy, **Paula Castaño** of Island Conservation, and **Michael Moen** and **Lucia Norris** of Jocotoco Foundation. The group was joined by **Christine Bogle**, Secretariat for the Agreement on the Conservation of Albatrosses and Petrels (ACAP), and **Tatiana Neves** of Projecto Albatroz, Brazil. The purpose of this meeting was to bring together researchers, governmental agencies, and non-profit groups with the shared interest of coordinating future conservation actions for Ecuador endemic Galápagos Petrel to draft a plan of action. The group made recognition the 30-year effort of work of **Kleber Aquilar** and the other park guards of Galapagos National Park who work to protect petrel nests. A special dedication was made by **Elicer Cruz** to the memory of **Felipe Cruz**, who was one of the first Galapagos-based biologists to work on the biology and advance conservation actions for the Galapagos Petrel.

Fernando Medrano, **Rodrigo Silva**, **Ronny Peredo**, **George Wallace**, and **Brad Keitt** (American Bird Conservancy), **Rodrigo Silva** of Red de Observadores de Aves y Vida Silvestre de Chile (ROC), and the team of Red de Observadores de Aves y Vida Silvestre de Chile, with support of American Bird Conservancy (ABC) and the Pacific Seabird Group (PSG) are still working on understanding the natural history of storm-petrels and arranging for their conservation in the Atacama Desert. They found new breeding sites and improved knowledge on population estimations, phenology and threats for Markham's Storm-petrel (*Oceanodroma markhami*) and Hornby's Storm-petrel (*O. hornbyi*) (Medrano et al., Revista Chilena de

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Ornitología 25:1, 2019; <https://aveschile.cl/wp-content/uploads/2019/06/Medrano-et-al-21-30.pdf>). They also obtained the first audio recordings for the Hornby's Storm-petrel near Diego de Almagro and Quiuña, using autonomous recorders provided by the Bioacoustics Research Program of the Cornell Lab of Ornithology (available here: <https://ebird.org/media/catalog?taxonCode=risset1&mediaType=a&q=Ringed%20Storm-Petrel%20-%20Oceanodroma%20hornbyi>). Recently, they started monitoring the breeding population of Markham's Storm-petrel colonies using autonomous recording devices in collaboration with ABC and Conservation Metrics. For conservation purposes, they led a review on the effect of light pollution on seabirds in Chile, proposing technical measures to prevent and mitigate this impact (Silva et al., Ornitología Neotropical, in press). They have also promoted an update on the national light pollution policy. In Arica (~18°S) they are running a rescue program with the support of the local county, focused on Markham's Storm-petrel fledglings, having rescued >1,100 individuals during the 2018-2019 season and >1,000 in the current season. To support these efforts, they are working along with the Ministerio de Medio Ambiente de Chile (MMA) and other key stakeholders in drafting a conservation plan for the storm-petrels breeding in northern Chile. This plan includes the two species mentioned above in addition with Elliot's Storm-petrel (*Oceanites gracilis*) and Wedge-rumped Storm-petrel (*Oceanodroma tethys*). Regarding other seabird species, they are starting to work with the Peruvian Tern (*Sternula lorata*), mapping threats on breeding colonies of the Tarapacá Region (northern Chile) and proposing priority conservation actions for this area.

Cristián G. Suazo and **Patricio Ortiz-Soazo** (Albatross Task Force-Chile [ATF-Chile]), along with their fisheries and research collaborators, have conducted experimental trials to reduce the seabird bycatch in Chilean

fisheries. Among these, the team has worked on modifications that contribute to reducing the entanglement and entrapment of seabirds in purse seine and trawl fisheries (both in industrial and small-scale fleets). In experiments onboard these fisheries, it has been possible to reduce bycatch events by >95%, which supports new regulations established by the Chilean government (<https://www.birdlife.org/worldwide/news/chile-announces-vital-new-regulations-protect-seabirds>). These actions are supporting the conservation status of target seabird species like the Black-browed Albatross (*Thalassarche melanophrys*), Gray-headed Albatross (*T. chrysostoma*), Pink-footed Shearwater (*Ardenna creatopus*), Sooty Shearwater (*A. grisea*), and White-chinned Petrel (*Procellaria aequinoctialis*), among other threatened species.

For this work, the collaboration with fisheries has been important. Thus, a key milestone towards the promotion of compliance of mitigation measures in Chile was the first collaboration agreement between ATF-Chile and the Chilean Industrial Fisheries Association (<https://acap.aq/en/latest-news/3372-birdlife-international-s-marine-programme-and-the-association-of-industrial-fisheries-of-chile-sign-a-cooperation-agreement-to-reduce-seabird-bycatch>). This cooperation plan has allowed ATF-Chile to collect seabird bycatch information during commercial operations and transfer knowledge so deck crews can deploy mitigation measures, as well as seabird rescue and handling protocols.

In the international context, ATF-Chile has participated in the 9th meeting of the Seabird Bycatch Working Group (SBWG9) of the Agreement on the Conservation of Albatrosses and Petrels (ACAP). The team shared recommendations about training on mitigation techniques for trawl crews (e.g. the use of bird-scaring lines) through in-situ promotion while onboard. These activities were developed in south-central Chile, with the support of ATF-Argentina and

the collaboration of the Institute for Fisheries Development (IFOP) based in Chile (Suazo et al., SBWG9 Doc 14, 2019; <https://acap.aq/en/working-groups/seabird-bycatch-working-group/seabird-bycatch-wg-meeting-9/sbwg9-meeting-documents/3338-sbwg9-doc-14-chile-argentina-an-at-sea-classroom-for-mitigation-in-trawl-fisheries-summary-only/file>).

ACAP brings together 13 countries with a focus on the conservation of 31 species of albatrosses, petrels, and shearwaters. ATF-Chile has also shared recommendations on best practices for purse-seine fisheries including a review of the effectiveness of available mitigation measures and complementary actions on board, such as rescue and handling recommendations for fishing crews (Suazo et al., SBWG9 Doc 26, 2019; <https://acap.aq/en/working-groups/seabird-bycatch-working-group/seabird-bycatch-wg-meeting-9/sbwg9-meeting-documents/3436-sbwg9-doc-26-best-practice-advice-for-mitigating-seabird-bycatch-in-purse-seine-fisheries-summary/file>). The inclusion of this research by ATF-Chile in the context of the SBWG has been strongly supported by **Cristián** becoming an official member of this group in May 2019.

In October 2018, **Nick Holmes** (The Nature Conservancy) and **Coral Wolf** (Island Conservation) along with volunteers **Claudia Fernández** (Universidad Católica del Norte, post-doc), and **Trevor Joyce** (NOAA) conducted surveys of all known Peruvian Diving-petrel (*Pelecanoides garnotii*) breeding colonies on Isla Choros. They mapped the breeding area to determine colony size, estimated nest density and occupancy, and measured acoustic activity rates at colony and non-colony sites. All metrics increased significantly since 2010 (except acoustic activity which is currently being analyzed).

In September 2019, **Claudia Fernández** (Universidad Católica del Norte), **María José Vilches** (Island Conservation), **Ivan Torres**, and **Cristian Rivera** (both with Corporación

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Nacional Forestal) initiated social attraction activities on Isla Chañaral where the Peruvian Diving-petrel was extirpated by introduced foxes. The team deployed two sound systems with artificial burrow entrances plus camera traps to monitor any diving-petrel visitation.

Jonathan Felis and **Josh Adams** (U.S. Geological Survey [USGS]) worked with **Ryan Carle** (Oikonos) and Chilean collaborators to study foraging ecology, diving behavior, fisheries overlap, and migratory behavior of Pink-footed Shearwaters (*Ardenna creatopus*). Multiple manuscripts were published this year:

1. Carle RD, JJ Felis, R Vega, J Beck, J Adams, V López, PJ Hodum, A González, V Colodro, T Varela. 2019. Overlap of Pink-footed Shearwaters and central Chilean purse-seine fisheries: Implications for bycatch risk. *The Condor* 121.
2. Felis JJ, J Adams, R Carle, P Hodum. 2019. Eastern Pacific migration strategies of pink-footed shearwaters *Ardenna creatopus*: implications for fisheries interactions and international conservation. *Endangered Species Research* 39:269–282.

CANADA

Compiled by Kerry Woo

WESTERN CANADA

Laurie Wilson (Environment and Climate Change Canada [ECCC]-Canadian Wildlife Service [CWS], Delta, British Columbia [BC]) coordinated the Pacific CWS Seabird Colony Monitoring Program in 2019, revisiting permanent plots and assessing occupancy rates at the Cassin's Auklet (*Ptychoramphus aleuticus*), Rhinoceros Auklet (*Cerorhinca monocerata*), and Tufted Puffin (*Fratercula cirrhata*) colonies on Triangle Island within the Anne Vallee Ecological Reserve, BC. Investigation into how audio recording

units (ARUs) & trail cameras could augment CWS's long-term monitoring of population trends of burrow-nesting seabirds continued. Field crew included **Laurie Wilson**, **Erika Lok** (ECCC-CWS, Delta, BC), **Madelyn de la Rama** (ECCC-CWS, Delta, BC), **Glen Keddie** (contractor, Smithers, BC), and **Vivian Pattison** (MSc. Candidate, University of Victoria, BC [UVIC]).

Global Positioning System (GPS) tracking devices were deployed on incubating Ancient Murrelets (*Synthliboramphus antiquus*) on George Island (south Haida Gwaii). Single foraging trips for one bird of mated pairs were tracked. **Vivian Pattison** will analyze the tracklogs as part of her graduate work at UVIC. Specifically, she will determine how to identify Ancient Murrelet behavior states from GPS track logs, use these logs to determine home range and potential foraging locations, and explore whether biophysical variables (such as bathymetry, sea surface height anomaly, and chlorophyll-a) correlate with the foraging locations. Field crew included **Laurie Wilson**, **Glen Keddie**, **Vivian Pattison**, and **Dan Shervill** (ECCC-CWS, Delta, BC).

Baseline colony surveys for Leach's Storm-petrels (*Oceanodromaleucorhoa*) and Fork-tailed Storm-petrels (*O. furcata*) in British Columbia have been limited since the original surveys in the 1980s. In response to noted population declines for Leach's Storm-petrels on the east coast of Canada, the Oceans Protection Plan has prioritized colony surveys on key storm-petrel colonies in British Columbia over the next few years. In 2019, ECCC-CWS ran a pilot project to evaluate the efficacy of both the original quadrat-transect method and the emerging distance sampling method of surveying seabird colonies. Both survey approaches were conducted on Rock Islet 1 (Copper Islands, Haida Gwaii), while a single survey using the quadrat-transect approach was completed on Skincuttle Island (Copper Islands, Haida Gwaii) and a single survey using distance sampling was

completed for the storm-petrel colony on Hippa Island (west coast Haida Gwaii). **Dan Shervill** (ECCC-CWS, Delta, BC) led a field crew conducting the quadrat-transect survey on Rock Islet and Skincuttle Island; field crew included **David Bradley** (Bird Studies Canada) and **Kerrith McKay** (ECCC-Wildlife Research Division [WRD], Delta, BC).

In addition, **Laurie Wilson** continues with her assessment of seabird bycatch in commercial salmon gillnet fisheries. Reports of bird entanglements from Department of Fisheries and Oceans (DFO) test fisheries with observer programs and bycatch events reported by fishers will be tallied; these data will be used to derive seabird bycatch estimates.

Mark Hipfner (ECCC-WRD, Delta, BC) reports that summer 2019 marked the 26th year of operation of the Centre for Wildlife Ecology's seabird research and monitoring program on Triangle Island. The 2019 field crew consisted of **Kim Dohms** and **Josh Green** (both ECCC-CWS, Delta, BC), **Nik Clyde**, **Sarah Hudson**, **Kerrith MacKay**, **Megan Ross**, **Ken Wright** (all ECCC-WRD, Delta, BC), **Catherine Jardine** (Bird Studies Canada), and **Mark Hipfner**. As in past years, the Triangle Island field crew monitored breeding chronology, breeding success and nestling diet in Cassin's Auklet, Rhinoceros Auklet, and Black Oystercatcher (*Haemotopus bachmani*), and banded songbirds in the vicinity of the cabin. The crew also conducted a pilot project investigating the feasibility of using cameras to monitor oystercatcher nests, deployed audio recording units to index seabird nesting density and the presence/absence of bats, and deployed GPS tags on 10 Tufted Puffins, obtaining complete (24-hour) tracks for six birds.

Research also continued on several other major Rhinoceros Auklet colonies in BC in 2019, including Pine Island, Lucy Island, S'Gang Gwaay, and Cleland Island. The primary objective of this program, which was initiated in 2006, is to study the effects of oceanographic

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variation on multiple trophic levels – the diets fed to nestling auklets and the diets of their major fish prey, Pacific sand lance (*Ammodytes personatus*), Pacific herring (*Clupea pallasii*), and Pacific salmon (*Oncorhynchus spp.*). Collaboration on this project continues with researchers in Washington State, and with the Department Fisheries and Oceans Canada (DFO) in Nanaimo. They also deployed GPS tags on 10 Rhinoceros Auklets on S'Gang Gwaay, and collected blood samples and feathers from adult auklets on all colonies visited in 2019 for baseline health assessments in collaboration with researchers with Washington Department of Fish and Wildlife and the University of California, Davis. They also completed the seventh year of a project investigating the consumption of salmon by seabirds in BC waters, in collaboration with **Strahan Tucker** (DFO, Nanaimo-Pacific Biological Station), and completed the tenth year of a project investigating the ingestion of microfibres/microplastics by forage fish, in collaboration with **Moira Galbraith** (DFO, Sidney - Institute of Ocean Sciences). The field crew for the BC portion of the work consisted of **Mark Hipfner, Nik Clyde, Megan Ross, Kirk Hart** (Coast Mountain College, Prince Rupert), **Eric Gross, Andrew Huang, Agathe Lebeau, and Kate Shapiro** (all ECCC-CWS, Delta, BC).

Trudy Chatwin (retired biologist) carried on with Double-crested Cormorants (*Phalacrocorax auritus*) surveys in the Strait of Georgia (Canadian section of the Salish Sea). The purpose of the surveys is to contribute to understanding of Double-crested Cormorant populations and distribution across western North America in relation to management decisions (especially in relation to cormorant control in the Columbia River estuary and bridge nesting sites in Vancouver). With assistance from **Jenna Cragg** (Ministry of Forests, Lands, Natural Resource Operations and Rural Development, BC [MFLNRORD, BC]) surveys were also carried out at Gabriola Island as well

as some other cliffs and islands near Ladysmith. **Mason King** and **Megan Willie** (ECCC-CWS, Delta, BC) surveyed Vancouver Bridges as part of the Pacific Flyway Council long-term monitoring sites and where proposed nesting closure may occur. Other cormorant counters included **Marilyn Lambert** for Mandarte Island, **Alison Watt, Nancy Baron, Don Griffiths, and Peggy Sowden** (volunteers for the Mitlenatch Island Stewardship Team).

Trudy also spent nearly a month volunteering as a field assistant for **Luke Halpin** (PhD candidate, Monash University) on Phillip Island located in the South Pacific off Norfolk Island. **Luke** is researching feeding and breeding range of White-necked Petrels (*Pterodroma cervicalis*) and Black-winged Petrels (*Pterodroma nigripennis*). It was a great experience to work among so many seabirds and a link to **Trudy's** blog can be found here: <https://trudyspacificadventures.travel.blog/>.

The Laskeek Bay Conservation Society (LBCS), based in Skidegate, BC, completed their 30th field season (May 3 - July 18) of monitoring marine and terrestrial ecology in Laskeek Bay, Haida Gwaii. **Neil Pilgrim** and **Sonya Panozzo** (both of LBCS, Skidegate, BC) coordinated the various research and monitoring projects at the field station on East Limestone Island, including Ancient Murrelet colony monitoring, Pigeon Guillemot (*Cephus columba*), and Cassin's Auklet nestbox monitoring, Glaucous-winged Gull (*Larus glaucescens*) colony censuses, and Black Oystercatcher surveys. Seven boat surveys for seabirds were conducted throughout the season, monitoring trends of at-sea Marbled Murrelets (*Brachyramphus marmoratus*) and other seabirds. Marbled Murrelet sightings were very high this year with 681 sightings during all surveys. Many volunteer and student assistants joined the field staff this season, and there were visits from local school and tour groups, who learned about seabird biology, local ecology, and conservation issues.

In May and June, monitoring of Ancient Murrelet chick departures from the Limestone Island colony took place for the 30th consecutive season. Similar to 2017 and 2018, very few chicks were counted leaving this colony. The number of chicks has been declining over time, in part, due to severe predation by raccoons (*Procyon lotor*) in the 1990s, and windfall in approximately 40% of the colony area. From 1990 to 2018, manual capture of Ancient Murrelet chicks was the primary means of counting, but in 2019 monitoring became completely automated through the use of thermal motion cameras. Monitoring for raccoons throughout the murrelet breeding season is also conducted with this technology. Black Oystercatcher surveys found that 73% of known territories in Laskeek Bay were occupied. At the end of June, LBCS staff and volunteers were joined by the science advisor **Tony Gaston** (LBCS, Ottawa, ON) who helped attach 15 geolocators to adult Pigeon Guillemots occupying nestboxes. This project, conducted in conjunction with the Canadian Wildlife Service, is attempting to identify important wintering and stopover areas of the Pigeon Guillemots. Currently, there are no data on where Pigeon Guillemots breeding in Haida Gwaii spend the winter.

Kerry Woo (ECCC-CWS, Delta, BC) continued work on recovery planning for federally-listed species and at risk marine birds in the Pacific region, with a focus on Marbled Murrelets. In 2019, those efforts continued to support completion of an amendment to the federal recovery strategy for Marbled Murrelets (Environment Canada. 2014. Recovery Strategy for the Marbled Murrelet [*Brachyramphus marmoratus*] in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. v + 44 pp.), with the intent to include a partial identification of marine critical habitat. In support of this, collaborations with **Doug Bertram** (ECCC-WRD, Sidney, BC) and **Cliff Robinson** (DFO, Nanaimo, BC) continued to develop modeling

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and partial mapping of candidate marine critical habitat for Marbled Murrelets in coastal British Columbia waters. Additional work to support data collection on at-sea distributions of Marbled Murrelets (and other species), included at-sea surveys in Barkley Sound on the west coast of Vancouver Island in August with **Doug** and **Bruce Evans** (vessel charter).

Other work in 2019 included continued collaboration with **Laurie Wilson** to support monitoring of Ancient Murrelets in Haida Gwaii, BC, and support of at-sea bird surveys with **Caroline Fox** (ECCC-CWS, Delta, BC) to collect baseline distribution and occurrence of marine birds throughout the Canadian portion of the Salish sea and Juan de Fuca Strait.

In addition, **Kerry** worked together with **Ken Morgan** (ECCC-CWS, Sidney, BC) and **Caroline Fox** to provide funding and support for conservation initiatives for Pink-footed Shearwaters (*Ardenna creatopus*) at their breeding colonies in Chile by Oikonos Ecosystem Knowledge.

Bernard Schroeder (Bernard K. Schroeder Consulting [BKSC]) together with **Alec Wilson**, **Wylie Middleton**, and **Ryan Adams** of SKY Helicopters (SKY) conducted a Low Level Aerial Survey (LLAS) of areas of potential suitable Marbled Murrelet nesting habitat for **Christine Petrovic** and **Daniel Guertin** of the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (MFLNRORD, BC) in the lower mainland (Vancouver, BC area) and adjacent islands of the Southern Mainland Coast Conservation Region, in prioritized areas of Provincial Crown land, tenured woodlots and parks.

Bernard conducted Marbled Murrelet radar counts at four long-term population trend monitoring locations in the East Vancouver Island (EVI) Conservation Region of British Columbia for **Kerry Woo**, **Lisa Bland**, **Avryl Brophy**, **Devan Johnson**, and **Guy Monty** (all contractors - BKSC) provided audio visual (AV) support

surveys. These surveys included a study comparing radar counts between two differently modified antennas to account for equipment used historically vs. presently as part of the project - surveyed locations included Comox Lake, Lake Cowichan, Kelsey Bay and Sooke Lake. In addition, **Bernard** and **Lisa Bland** conducted a third season of Marbled Murrelet radar and concurrent AV surveys for **Louise Waterhouse** (MFLNRORD, BC) in the Klanawa, Sooke Lake and Tsitika watersheds of Vancouver Island. Studies were designed to compare Marbled Murrelet radar counts and AV observations with vocal activity sampled with ARUs in discrete habitat patches.

Bernard, Dave Baird (BKSC), **Lisa Bland**, and **Guy Monty** conducted Marbled Murrelet radar and AV surveys for **Jenna Cragg** (MFLNRORD) in East Vancouver Island and Lower Mainland locations. Marbled Murrelet abundance was measured in watershed areas that had not been previously surveyed, or had not been repeated in >15 years. This is a step in the Province led implementation planning stage (BC MFLNRORD 2018) regarding the Federal Marbled Murrelet Recovery Strategy (Environment Canada 2014) to inform the Provincial strategy in allocating habitat for species protection.

Bernard and **Dave Baird** conducted seabird transect surveys throughout the Salish Sea for **Caroline Fox** to sample seabird densities as part of the federal Oceans Protection Plan.

Bernard and **Guy Monty** conducted Marbled Murrelet radar and AV surveys in the Squamish and Indian River areas with support from **Pablo Jost** and **Yonase Gulbot** of EDI-Environmental Dynamics and **Sara McLaughlin** of Jacobs Consultancy Canada Inc. to investigate murrelet abundance along proposed Eagle Mountain – Woodfibre gas pipeline project.

Bernard and **Todd Manning** (Strategic Resource Solutions) held a training workshop presenting ‘Guidance and Tools to Support the Identification of Potential Marbled Murrelet Suitable

Nesting Habitat’ (CWS Technical Report No. 536. Manning, et al. 2018) for **Kerry Woo** in February 2019.

Daryl Henderson (volunteer, Port Alberni, BC) and **Spencer Sealy** (University of Manitoba, Winnipeg) have been monitoring Marbled Murrelet attendance on Sproat Lake near Port Alberni on Vancouver Island. Initial observations of multiple birds on the lake were made in January and February 2018, and later observations were made in November and December 2018. Monitoring of Sproat Lake (Klehkoot Arm) continued throughout 2019, with at least one visit per week, weather permitting. Combining both years, Marbled Murrelets were recorded on the lake in all four seasons, but with highest numbers in winter (particularly December and January). Plans are to continue monitoring Sproat Lake and to check other nearby lakes (e.g. Great Central Lake, Nahmint Lake) to establish the species’ attendance on freshwater lakes.

Louise Blight (Procellaria Research & Consulting; and School of Environmental Studies, University of Victoria [both BC, Canada]) continues working with **Douglas F. Bertram** and **Edward Kroc** (University of British Columbia, Vancouver) on population trends and demography of urban-nesting Glaucous-winged Gulls (*Larus glaucescens*) in British Columbia. Earlier results just published as Blight et al., Evaluating unmanned aerial vehicle-based techniques to census an urban-nesting gull population on Canada’s Pacific coast (Journal of Unmanned Aerial Systems, early online. <https://doi.org/10.1139/juvs-2019-0005>).

Ken Morgan continued as the PSG’s Delegate to the Agreement on the Conservation of Albatrosses and Petrels (ACAP); the (Alternate) PSG Delegate to the World Seabird Union (WSU), with **Kathy Kuletz** (U.S. Fish and Wildlife Service [USFWS]) as the Primary Delegate; and as a member of the PSG’s Election Committee. **Ken** also continues as the (Alternate) North American WSU Board Member, with

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Kim Nelson (Oregon State University) as the Primary North American WSU Board Member. For the third time in a row, **Ken** is a member of the Third World Seabird Conference (WSC3) Travel Awards Committee. The WSC3 will be held in Hobart, Tasmania, in October 19-23, 2021 (<https://worldseabirdconference.com/>).

In addition, **Ken Morgan**, **Caroline Fox**, and **Kerry Woo**, are collaborating with **Valentina Colodro**, **Michelle Hester**, and **Peter Hodum** (Oikonos Ecosystem Knowledge, Chile, Hawaii and Washington [respectively]) on Pink-footed Shearwater (PFSH) conservation initiatives. Through a 3-year agreement, ECCC is contributing funding support for Oikonos-led initiatives including: building a mammal-proof fence to protect a PFSH breeding colony on Isla Robinson Crusoe (Juan Fernández Archipelago, Chile); developing community outreach materials, and assessing PFSH chick provisioning. These initiatives closely align with Canada's Pink-footed Shearwater recovery objectives (Environment Canada, 2008 [Recovery Strategy for the Short-tailed Albatross (*Phoebastria albatrus*) and the Pink-footed Shearwater in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa]; available at: <https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/recovery-strategies/short-tailed-albatross-pink-footed-shearwater-final.html>).

As well, in May 2019, **Ken** attended meetings of ACAP's Advisory Committee (AC), the Seabird Bycatch Working Group and the Population and Conservation Working Group, in Florianopolis, Brazil. During the AC meeting, a proposal was tabled to establish a World Albatross Day (WAD, see: <https://www.acap.aq/en/latest-news/3328-acap-proposes-a-world-albatross-day-to-increase-global-awareness-of-the-conservation-crisis-facing-albatrosses-and-petrels>) to be marked annually on June 19 (commencing in 2020). The goal of the

WAD is to provide "...greater visibility to the conservation crisis that continues to face albatrosses and petrels." During the AC, an intersessional working group was established to progress the WAD. Shortly after returning home, **Ken** accepted an invitation to join the WAD working group. For more information about WAD see: <https://acap.aq/en/latest-news/3440-in-their-own-words-acap-s-working-group-convenors-signal-their-support-for-next-year-s-world-albatross-day>.

Alan Burger (University of Victoria and independent consultant) is mostly retired but continues some work on the Marbled Murrelet including contracts, reviews, conservation and publishing. **Alan** also does sporadic gigs as a naturalist/lecturer in the Antarctic with Aurora Expeditions.

ARCTIC CANADA

In summer 2019, **Kyle Elliott** (McGill University) and **Grant Gilchrist** (Environment and Climate Change Canada-Wildlife Research Division, Ottawa, Ontario [ECCC-WRD, Ottawa, ON]) continued work at Coats Island, Nunavut, on Thick-billed Murres (*Uria lomvia*) and Glaucous Gulls (*Larus hyperboreus*). Post-doctoral researcher **Emily Choy** (McGill University), PhD students **Allison Patterson** (McGill University) and **Shannon Whelan** (McGill University), and MSc student **Alyssa Eby** (University of Windsor, supervised by **Oliver Love**) were present. Alongside contractors **Sarah Poole**, **Sam Richards**, **Russel Turner**, and **Douglas Noblet**, and Inuit field technicians **Josiah Nakoolak** and **Jupie Angootealuk**. In addition to continuing long-term population monitoring, researchers are using Global Positioning System (GPS) tracking, accelerometers, heart-rate loggers, and geolocators to study movements, behaviour, and physiology of both species during the breeding and non-breeding season.

As part of the research at Coats Island, **Alyssa Eby** is studying foraging ecology and energetic physiology of Thick-billed Murres. GPS accelerometers

were deployed during the incubation and chick-rearing periods to determine foraging effort of murres. Murres were also blood sampled before and after GPS deployments to measure stable isotopes, energetic hormones (corticosterone), and energetic metabolites (non-esterified fatty acids, beta-hydroxybutyrate, and triglycerides) to determine foraging success.

EASTERN CANADA

Dave Shutler (Acadia University) studies Leach's Storm-petrels (*Oceanodroma leucorhoa*) in Atlantic Canada, and collaborates with other researchers in the region to identify causes of recent, significant population declines. **Rielle Hoeg** (MSc candidate, Acadia University), aided by **Safyha Bryan** (BSc, Acadia University) and volunteers, completed a second field season quantifying predation at a few storm-petrel breeding colonies in Nova Scotia. **Rielle Hoeg** began investigating whether presumed herbivorous meadow voles (*Microtus pennsylvanicus*) are consuming petrel eggs and chicks based on telemetry and stable isotopes.

Field work on Bon Portage (Outer) and Country Island, Nova Scotia, used transects to count the remains of predation events from May to October, and used live traps to capture meadow voles to collect their fur and feces for stable isotopes analysis. **Rielle Hoeg** collected coastal vegetation and opportunistic tissue samples from deceased petrels for background isotope signatures. There was proportionately more predation on Bon Portage than Country Island, which may be because there is a predator control program on Country Island, although there are fewer transect checks there. However, egg predation was proportionately higher on Country Island, possibly due to the dense, stressed meadow vole population there. Meadow vole samples are being prepared for stable isotope analysis and results will inform future studies and potentially predator management.

Safyha Bryan, aided by **Rielle Hoeg** and volunteers, measured the sub-lethal effects of mercury on petrels by

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collecting feathers and blood from adults and chicks, monitoring reproductive success, and measuring blood glucose and hemoglobin levels. Initial results indicate that methylmercury levels were higher in feathers than in blood for both adults and chicks. Preliminary results also suggest that glucose and hemoglobin concentrations were lower for birds with higher body mass. There was a strong negative correlation between chick feather methylmercury and blood glucose levels; the relationship was not significant in adults. Feather methylmercury was positively correlated with blood hemoglobin in chicks and negatively so in adults. Additional analyses are underway.

ASIA & OCEANIA Compiled by Luke Einoder

ASIA

Kuniko Otsuki, Yutaka Nakamura, Yoshitaka Minowa, and Takehiro Yoshimoto (all from the Marine Bird Restoration Group, Japan), as well as **Darrell Whitworth** and **Mike Parker** (both from California Institute of Environmental Studies, USA) performed surveys of Japanese Murrelets (*Synthliboramphus wumizusume*) at Biro Island, Miyazaki Prefecture, Japan. The project was funded by the Suntory Group. Three complementary survey techniques were used: (1) spotlight surveys on three concentric round-island transects and seven radial transects to determine the number and density of murrelets congregating around Biro Island at night; (2) at-sea captures to examine the breeding status of murrelets in the congregation; and, (3) nest monitoring to determine timing of breeding. Surveys were conducted on April 1-8, 2019. Previous surveys have revealed that Biro Island is home to the largest known Japanese Murrelet colony in the world. The combined numbers counted on round-island transects ranged from 1,612 to 2,487 murrelets while only 42 were counted on the radial

transects performed further from the island. Counts in 2019 were lower than in the previous year. Rats were detected on the island in 2018 (**S. Sakamoto**, pers. comm.). An annual report will be completed by the end of February 2020.

Masayoshi Takeishi, Shigeo Sato, and Kuniko Otsuki (all from Marine Bird Restoration Group, Japan), with **Noriyuki Yamaguchi** (Nagasaki University), as well as **Darrell Whitworth** and **Mike Parker** performed surveys from March 29-31 to assess the current status of Japanese Murrelets breeding at 3 islands (Tsushima, Kainage-jima, and the North and South Islets of Kotsu-shima) off Mugi-cho in Tokushima Prefecture, off the east coast of Shikoku, Japan. Nest searches, nocturnal at-sea spotlight surveys, and diurnal boat surveys were performed. The project was funded by Pro-Natura Group. Nest searches confirmed incubating murrelets at both the North and South Islets of Kotsu-shima and Kainage-jima for the second consecutive year. At Kainage-jima many eggshell fragments were found scattered on the ground suggesting depredation of nests. Motion sensor cameras deployed at the entrances to several nests detected egg predation by crows. No rodents were detected on camera, although rodent feces were detected on the island the previous year. In addition, a ground search of Tsushima – considered a potential breeding site – revealed several murrelet carcasses, but no nests were found. Small mammal feces were detected on Tsushima, although the deployment of wax tags and motion sensor cameras failed to confirm the presence of rodents. During round-island transects 200 m from shore, 194–635 murrelets were counted at Kotsu-shima and 68 murrelets were counted at Kainage-jima. An annual report was completed in November 2019.

Naya Sena (MSc Candidate, Hokkaido University) and **Yutaka Watanuki** (Hokkaido University) conducted research on seabird responsiveness to Dimethyl Sulfide (DMS) – a proven olfactory navigational

cue used by Procellariiforms to locate foraging grounds. Recent studies have indicated a relationship between DMS responsiveness and frequency of plastic ingestion, suggesting that seabirds may be unable to identify between plastic debris and prey. DMS response tests were conducted in August - September 2019 at the Daikoku Island Leach's Storm-petrel (*Oceanodroma leucorhoa*) colony and Awashima Island Streaked Shearwater (*Calonectris leucomelas*) colony, both located in Japan. Experiments on adult birds involved the use of a Y-maze with DMS in one testing arm, and a control substance in another testing arm. Individuals were placed in the maze and the birds choice and behavioral response was recorded. In collaboration with **Akiko Shoji, Kyle H. Elliott, and Scott A. Hatch** (all from Institute for Seabird Research and Conservation, USA) the response of Black-legged Kittiwakes (*Rissa tridactyla*) chicks to DHS was tested at the radar towers colony of Middleton Island, Alaska in July 2019. Chicks on their nest were presented with three different odors, distilled water, capelin (*Mallotus villosus*), and DMS, and their behavioral response was recorded. Results allowed the assessment of a potential sensory mechanism of plastic ingestion during foraging. Research findings and a detailed discussion will be presented at the Pacific Seabird Group Meeting in 2020.

Jeong-hyeon Park (PhD candidate, Waterbirds Network, Korea) monitored breeding behavior of the Black-faced Spoonbill (*Platalea minor*) at Mae-do Island, in Incheon, Korea. Motion-sensor cameras were used to monitor nest-attendance and breeding success. Female Black-faced Spoonbills looked after eggs and chicks during the daytime while males stayed with their eggs and chicks at nighttime. Spoonbill parents that performed longer foraging trips had lower reproductive success.

Yangmo Kim and **Chang-uk Park** (both at Korea National Park Research Institute, Korea) performed a nocturnal boat-based seabird survey on April

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16, 2019 near Baekdo Islet, South Korea. A total of 450 Crested Murrelets (*Synthiboramphus wumizusume*) were recorded.

Miran Kim and **Young-soo Kwon** (both at Korea National Park Research Institute, Korea) with **Mijin Hong** (Kyung Hee University) monitored Black-tailed Gull (*Larus crassirostris*) breeding at colonies on Hongdo Island in the Straits of Korea, Nando Island in Yellow sea, and the Liancourt Rocks in the East Sea. Black-tailed Gulls on Hongdo tend to breed earlier than the other colonies (2003-2019).

Miran Kim (Korea National Park Research Institute, Korea), **Mijin Hong**, and **Kibaek Nam** (both Kyung Hee University, Korea) investigated the extent of marine microplastic ingestion by seabirds in Korean Waters. Corpses of several seabird species were collected from 2016 to 2019 and dissected to assess plastic ingestion. Half of the species studied had ingested micro/meso plastics, with the main type of plastics being polypropylene and polyethylene.

Abdulmaula Hamza (University of Malaysia, Terengganu/Malaysian Nature Society) continued a second year of monitoring a recently established colony of Little Terns (*Sternula albifrons*) on a rock breakwater at Terengganu beach. The colony moved from another site due to disturbance and potential predation by feral cats and rats and continues to grow in size. Under the supervision of **Abdulmaula Hamza**, **Kong Mei Shuet** (University of Malaysia) recently completed research on the breeding ecology and hatching success of Little Terns, while **Diyana Arissa binti Anuar** (University of Malaysia) studied colony habitat selection, and **Mohamed Amirulfahmi** (University of Malaysia) studied the growth rate of the Asian breeding population. Results are intended to be presented at the upcoming third International Seabird Conference in Tasmania 2020. Two publications were published on Malaysian seabird surveys: HAMZA, A., MAMAT, I.B.H. & ABDULLAH, M.T. 2019. Results of a seabird survey at the southern

Seribuat Archipelago, Johor, Malaysia. *Marine Ornithology* 47: 49-53; and more recently, HAMZA, A., CHEE HO, W. (In press) Updates on Seabirds of the northern Seribuat Islands, Pahang, Malaysia. *Marine Ornithology* 48: xx-xx.

Dan Roby, **Don Lyons**, **Kirsten Bixler**, and **Tim Lawes** (Oregon State University) continued to provide technical support and assistance for efforts to restore the critically endangered Chinese Crested Tern (*Thalasseus bernsteini*) in the People's Republic of China. Project leaders in China included, **Zhongyong Fan**, **Yiwei Lu**, and **Siyu Wang** (Zhejiang Museum of Natural History). The team, with the assistance of two dozen volunteers, banded 317 fledglings of Greater Crested Terns (*T. bergii*) and one fledgling Chinese Crested Tern with field-readable leg bands at a restored breeding colony on Tiedun Dao in the Jiushan Islands, Zhejiang Province. This year, about 70 adult Chinese Crested Terns attended the colony on Tiedun Dao, which was established using social attraction techniques six years ago, and 24 young Chinese Crested Terns were fledged from the colony this year. This Chinese Crested Tern restoration project is a past recipient of a grant from PSG's Craig S. Harrison Conservation Small Grants Program.

OCEANIA

Peter Kappes (Oregon State University) spent a week on Lord Howe Island, Australia, where he observed the Lord Howe Rodent Eradication Project.

Since retiring as the Curator of Birds at the Museum of New Zealand in 2009 after a 33 year stint, **Sandy Bartle** relocated to the city of Palmerston North and has published a few papers, including biographical notes. His lifetime interest in procellariiform ecology worldwide remains undiluted but conservation and related issues have lately absorbed most of his free time. He hopes to eventually publish his 30-year study on Westland Petrels (*Procellaria westlandica*) – all aspects, distinctive

behaviour, demography etc – plus several at-sea multi-species surveys. He has large amounts of quantitative data. Most of these papers are in draft and will be submitted to the premier New Zealand ornithological journal *Notornis* and thus available online. The geographical scope of these papers is mainly the Southwest Pacific. It is possible – but uncertain – that he will also publish more ecological work on the seabirds of the Poor Knights Islands, especially the relationship of petrel colony distribution and changes in density to vegetation, soils and other environment parameters, since 1812, on a predator-free island. Nine petrel species breed there on 168 acres. But his fieldwork is at an end.

EUROPE & AFRICA

Compiled by Ross Wanless

Scott Shaffer (San Jose State University) is collaborating with **Mike McFarlin** and **Cleber Ouvnery** (San Jose State University) and **Stefan Garthe** (University of Kiel) to compare the foraging ecology of gulls in the Baltic Sea using Global Positioning System logging, combined with metagenomics to examine the microbiomes of two gull species. **Scott** is also collaborating with **Olivier Chastel**, **Pierre Blevin**, **Henri Weimerskirch**, **Fredric Angelier**, and **Christophe Barbraud** of Centre National de la Recherche Scientifique - Centre d'Etudes Biologiques de Chizé (CNRS-CEBC) in France to examine egg attendance behavior and contaminants in high latitude species.

While not about seabirds, **Craig Harrison** published his travelogue *Dreams of a Vanishing Africa: A 1970s Transcontinental Trek*. **Craig** spent a year traveling with a friend on a shoestring within the fabric of African societies in 1971-1972, avoiding safe, well-trodden routes. Instead, **Craig** depended on decrepit trains, cargo trucks, rattletrap buses, jammed bush taxis, dugout canoes, and ferries. **Craig** lived out of a backpack and was eager to experience

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the land and people of Africa up close. He was mesmerized by the continent's beauty and its wildlife, and came to appreciate Africa's struggles, history, and injustices. This account of a grand adventure delivers the unvarnished truth in the tradition of travel writers such as **Paul Theroux**, **Shiva Naipaul**, **Peter Matthiessen**, and **V. S. Naipaul**. **Craig's** website has additional information <https://www.craigsharrison.net/>.

CIRCUMPOLAR

Elizabeth Phillips (National Oceanic and Atmospheric Administration) participated in two research cruises led by **Kristin Laidre** (Polar Science Center, Applied Physics Lab, University of Washington) of Melville Bay, Northwest Greenland in August 2018 and August 2019 to collect fisheries acoustic data near three glacier sites. She also conducted line transect surveys for seabirds and marine mammals near the glacier sites, and in 2019, collected diet and tissue samples from five seabird species (Glaucous Gull [*Larus hyperboreus*], Iceland Gull [*Larus glaucooides*], Black Guillemot [*Cepphus grylle*], Black-legged Kittiwake [*Rissa tridactyla*], and Northern Fulmar [*Fulmarus glacialis*]) for further analysis.

ANTARCTICA

Peter Kappes completed his PhD this spring at Oregon State University, where he worked with **Katie Dugger** (adviser, U.S. Geological Survey Cooperative Fish and Wildlife Research Unit) investigating the reproductive ecology and population dynamics of Adélie Penguins (*Pygoscelis adeliae*) breeding on Ross Island, Antarctica.

2018 ADDENDUM

Compiled by **Rachael Orben**

OREGON

Jane Dolliver (Oregon State University [OSU]), **Jessica Porquez** (Faculty Research Assistant, OSU), **Christian Cortez** (Intern, Environment for the Americas), **Ana Paula Medina Roman**, **Alyssa Nelson**, **Makenzie Weber** (undergraduates at OSU), **Don Lyons** (Assistant Professor – Senior Research, OSU), **Rachael Orben** (Assistant Professor – Senior Research, OSU), and **Rob Suryan** (National Oceanic and Atmospheric Administration) conducted studies of Common Murres (*Uria aalge*) and Pelagic and Brandt's Cormorants (*Phalacrocorax pelagicus* and *P. penicillatus*) at the Yaquina Head colony in Newport, OR. This is the twelfth consecutive year of collaborative studies at this site between Oregon State University, the Bureau of Land Management, and the U.S. Fish and Wildlife Service (USFWS). In 2018, they observed increased hatching (54%) and reproductive (fledglings per eggs laid; 43%) success for Common Murres at Yaquina Head. Success rates in 2018 highlighted a marked shift away from several years of total reproductive failure at the colony (2015-2017) and low success in the years preceding (2011-2014; 17-22%). Although there are no comparable hatching data from recent years (2015-2017) hatching phenology in 2018 (median hatch date July 15) was later than all previous study years (June 28, 2012; July 4, 2013; July 3, 2014). Frequency of Bald Eagle (*Haliaeetus leucocephalus*) disturbances at the colony declined steadily from June through the end of August. Anecdotally, the murres appeared more resilient to disturbances than in recent years, with faster recovery times of cleared/disturbed areas. A subset of these results were presented by undergraduates at PSG 2018 and at Oregon State University's Summer Undergraduate Research Symposium, Fisheries and Wildlife Research Advances in Fisheries, Wildlife and Ecology Symposium, and the College Of Agriculture Experiential Expo.

Rachael Orben, **Stephanie Lored**, **Don Lyons**, and **Josh Adams** (U.S.

Geological Survey [USGS]) continued a project with funding from the Bureau of Ocean Energy Management to use individual tracking to characterize resident and migrant seabird distribution and three dimensional movement patterns during winter, night, and inclement weather for species off Oregon. **Stephanie Lored** successfully defended her MSc thesis at Oregon State University, entitled "Movement, dive behavior, and habitat-use of Common Murres (*Uria aalge*) in the Northern California Current System".

Alayna Lawson and **Melanie Birch** (OSU Undergraduates), **Rachael Orben**, and **Don Lyons** monitored Western Gulls (*Larus occidentalis*) at the Cleft-in-the-Rock colony south of Yachats, Oregon, at the Yaquina Head colony, and on various buildings in Newport, Oregon. This year nest success was highest at Yaquina Head and similar at Cleft-in-the-Rock and Newport.

Rachael Orben completed a report comparing three methods of remote monitoring of Leach's Storm-petrels (*Oceanodroma leucorhoa*) at Oregon Coast National Wildlife Refuge (OCNWR): time-lapse cameras, passive acoustic monitoring, and radar. This report describes the results of data analyses and comparisons of these methods using data collected over three years by several partners, and presents ways that these could allow for more effective monitoring. The combined projects contributing to this report were funded by several funding streams through USGS and USFWS and were coordinated by **Roberta Swift** (USFWS), **Rob Suryan**, **Dan Roby**, and **Shawn Stephensen** (OSU). Songmeter, remote camera data and burrow occupancy data were collected by **Shawn Stephensen**, **Bill Bridgeland**, **Amelia O'Conner** (USFWS), **Rob Suryan**, **Peter Hodum** (University of Puget Sound), **Roberta Swift**, **Amanda Gladics** (OSU) and **Jessica Porquez**. Image counts were conducted by **Jessica Porquez** and **Ian Throckmorton** (OSU). Radar data were collected and analyzed by **Peter Sanzanbacher**, **Chris Swingley**, and

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Brian Cooper (ABR, Inc.). Songmeter data were analyzed by **Matthew McKown**, **Abram Fleishman**, and **David Savage** (Conservation Metrics, Inc.).

Kirsten Bixler (Faculty Research Assistant, OSU), **Tim Lawes** (Faculty Research Assistant, OSU), **Don Lyons**, and **Rachael Orben** installed two nest boxes for Pigeon Guillemots (*Cepphus columba*) underneath the ship operations dock at the Hatfield Marine Science Center for education, outreach, and research purposes for the third year. This year three chicks were banded and presumably fledged. A live feed was available (<http://webcam.oregonstate.edu/pigu>).

Kirsten Bixler, **Jess Porquez**, and **Don Lyons** continued assisting **Shawn Stephenson** on a multi-year project to estimate colony sizes of Common Murres and Brandt's Cormorants from photos collected over the past several decades by the OCNWR. Manual counting of digitized slides using Geographic Information System (GIS) software has begun. Future work will include continuing manual counts and investigating tools to automate counting. This project is supported by funding from the Bureau of Ocean Energy Management.

Don Lyons, **Adam Peck-Richardson** (Faculty Research Assistant, OSU), and **Alexa Piggott** (Visiting Research Scholar, OSU) continued the specification and testing of novel integrated tags to measure pressure (depth), temperature, and conductivity (salinity) and provide physical oceanographic data collected using diving seabirds (e.g., *Phalacrocorax spp.*) to oceanographers at OSU and elsewhere. Planning proceeded for multiple future deployments at

possible locations around the world. **Rachael Orben** also joined this effort as co-PI to explore future opportunities. This effort is funded by the Office of Naval Research.

Don Lyons accepted a new position with the National Audubon Society as Director of Conservation Science for the Seabird Restoration Program. He will continue to be affiliated with Oregon State University's Department of Fisheries and Wildlife as an Assistant Professor - Senior Research, and live in Oregon, but expand his field work to include seabird studies in the Gulf of Maine.

Leigh Torres (Assistant Professor, Marine Mammal Institute, OSU) and **Rachael Orben** in collaboration with **Rob Suryan**, **Josh Adams**, **Michelle Hester** (Oikonos), and **Scott Shaffer** (San Jose State University), are assessing the fine-scale overlap between albatrosses and fishing vessels in the North Pacific using tracking data and Global Fishing Watch (<http://globalfishingwatch.org/>). This effort is funded by NOAA-Bycatch Reduction Engineering Program.

ALASKA

Rachael Orben, **Alexander Kitaysky** (University of Alaska Fairbanks), **Rosana Paredes** (Oregon State University), **Abram Fleishman** (San Jose State University), and **Scott Shaffer** (San Jose State University), in collaboration with **Marc Romano** (Alaska Maritime National Wildlife Refuge), completed a study of carry-over effects on movements and life-history responses of Red-legged Kittiwakes (*Rissa brevirostris*) at St. George Island, Alaska. In late May and June 2018, **Ann Harding** (Seabird Youth Network), and two interns resighted kittiwakes that were banded during this project.

TREASURER'S REPORT FOR 2019

Kirsten Bixler

Our Fiscal Year (FY) 2019 extended from 1 October 2018 to 30 September 2019. The FY 2019 budget was approved by the Executive Council on 21 August 2018. It is in the black by \$5,836.15 not including endowment fund gains or Marine Ornithology's income and expenses. A complete summary of financial accounts (incomes and expenditures) is provided below.

The Pacific Seabird Group (PSG) completed the first year of quarterly internal financial statements in FY2019 which required basic proofing by the accountant and provided confirmation to EXCO that accounting was up-to-date.

Financial accounting was completed for Marine Ornithology for the second year in FY2019. A bank account was opened for Marine Ornithology and the PayPal account was linked to it instead of to PSGs general fund checking account.

A Square account was opened for PSG to receive credit card payments and an online store was opened to accept donations and sell merchandise.

Financial Accounts

PSG maintains a number of accounts to allow the organization to fulfill its mission.

REGULAR CHECKING ACCOUNT

PSG policy requires three years' worth of unrestricted operating funds be kept in the checking account.

September 30, 2015	\$68,154.50
September 30, 2016	\$52,164.86
September 30, 2017	\$44,027.81
September 30, 2018	\$74,728.29
September 30, 2019	\$90,678.67

PAYPAL

A PayPal account is used to accept membership dues, annual meeting registration, and donations but are part of the general fund. Funds are transferred into and out of the PayPal account as needed (e.g. student award donation is transferred to the student award account).

September 30, 2015	\$8,072.97
September 30, 2016	\$10,560.16
September 30, 2017	\$450.65
September 30, 2018	\$5,348.72
September 30, 2019	\$165.00

STUDENT TRAVEL FUND

The student travel fund is kept in a savings account and is restricted to student travel awards.

September 30, 2015	\$2,906.21
September 30, 2016	\$3,094.55
September 30, 2017	\$3,096.10
September 30, 2018	\$3,018.05
September 30, 2019	\$5,686.97

TREASURER'S REPORT FOR 2019

CRAIG HARRISON CONSERVATION FUND

The Conservation fund is kept in a savings account and are restricted funds.

September 30, 2015	\$6,507.23
September 30, 2016	\$7,235.43
September 30, 2017	\$8,114.31
September 30, 2018	\$7,114.94
September 30, 2019	\$6,626.85

FORMER CHAIRS FUND

The Former Chairs fund is kept in a savings account and is a restricted fund. \$2,500 of this fund is a loan from the regular checking account to avoid bank fees. The account type was changed so that there was no minimum required and the loan was returned to the checking account.

September 30, 2018	\$2,501.64
September 30, 2019	\$244.63

ENDOWMENT FUND

Our Endowment funds are kept in a mutual fund managed by Neuberger and Berman and are restricted funds.

September 30, 2015	\$181,268.22
September 30, 2016	\$200,190.51
September 30, 2017	\$237,195.93
September 30, 2018	\$240,467.22
September 30, 2019	\$252,247.01

MARINE ORNITHOLOGY

Pacific Seabird Group completed financial accounting for Marine Ornithology beginning in FY2018 and includes all accounts with the exception of a PayPal account (see above) as of August 2019. The most recent available information is presented below.

September 30, 2018	\$14,476.34
September 30, 2019	\$11,280.99

Total Assets as of September 30, 2015	\$266,909.13
Total Assets as of September 30, 2016	\$273,245.50
Total Assets as of September 30, 2017	\$292,884.80
Total Assets as of September 30, 2018	\$347,655.20
Total Assets as of September 30, 2019	\$366,930.12

REPORTS OF PSG OFFICERS

FY19 ACTUAL INCOMES AND EXPENDITURES

A. INCOME	Budgeted	Actual (as of 9/30/19)	Surplus/Loss
<i>Unrestricted:</i>			
Membership (annual regular, student): ¹	\$15,050.00	\$24,351.26	\$9,301.26
General Fund Donations ²	\$500.00	\$3,582.49	\$3,082.49
<i>Annual Meeting:</i>			
Kauai 2019	\$122,760.00	\$130,875.60	\$8,115.60
Meeting sponsorships ³	\$6,000.00	\$22,050.00	\$16,050.00
<i>Restricted:</i>			
Student travel ⁴	\$3,000.00	\$10,384.25	\$7,384.25
Publications ⁵	\$12,000.00	\$0.00	-\$12,000.00
Lifetime Memberships	\$500.00	\$2,700.00	\$2,200.00
Conservation Fund	\$600.00	\$3,381.41	\$2,781.41
Former Chairs Fund	\$0.00	\$2,142.76	\$2,142.76
A. TOTAL INCOME:	\$160,410.00	\$199,467.77	\$39,057.77
B. EXPENSES: Administrative Operations	Budgeted	Actual (as of 9/30/19)	Underspent/ Overspent
Chairs Discretionary Fund	\$0.00	\$1,432.13	-\$1,432.13
Insurance premium	\$1,500.00	\$1,595.74	-\$95.74
Other ⁶	\$0.00	\$3,665.46	-\$3,665.46
<i>Online Services:</i>			
Website/Email hosting	\$63.00	\$46.92	\$16.08
Survey Monkey	\$348.00	\$417.00	-\$69.00
QuickBooks online	\$780.00	\$750.00	\$30.00
<i>Operations:</i>			
Postage	\$50.00	\$39.85	\$10.15
Fax	\$0.00	\$4.95	-\$4.95
Telephone	\$500.00	\$155.32	\$344.68
Office supplies	\$30.00	\$0.00	\$30.00
USPS P.O. Box Rental	\$0.00	\$0.00	\$0.00
<i>Professional services:</i>			
Accountant/Bookkeeper ⁷	\$5,000.00	\$13,065.44	-\$8,065.44
Quarterly Internal Statement	\$1,500.00	\$1,500.00	\$0.00
<i>Service fees:</i>			
Cvent Fees ⁸	\$1,050.00	\$1,079.35	-\$29.35
Bank Fees	\$200.00	\$366.04	-\$166.04
Government Registration Fees	\$50.00	\$70.00	-\$20.00
B. TOTAL ADMINISTRATIVE OPERATIONS EXPENSES:	\$11,071.00	\$24,188.20	-\$13,117.20

REPORTS OF PSG OFFICERS

FY19 ACTUAL INCOMES AND EXPENDITURES

C. EXPENSES: Society Services (meetings, publications, support)	Budgeted	Actual (as of 9/30/19)	Underspent/ Overspent
<i>Unrestricted:</i>			
Annual Meeting:			
Conference venue, food, etc. ⁹	\$126,729.13	\$134,512.86	-\$7,783.73
Cvent fees ¹⁰	\$1,950.00	\$5,228.59	-\$3,278.59
PayPal fees	\$400.00	\$788.27	-388.27
Square fees ¹¹	\$0.00	\$982.44	-\$982.44
Compilation of scientific program	\$1,000.00	\$0.00	\$1,000.00
Student travel awards ¹²	\$0.00	\$1,083.68	-\$1,083.68
International travel awards ¹³	\$0.00	\$2,528.00	-\$2,528.00
Early career scientist awards	\$0.00	\$4,674.00	-\$4,674.00
Other:			
Former chairs fund grants ¹⁴	\$0.00	\$1,800.00	-\$1,800.00
WSTC award ¹⁵	\$0.00	\$200.00	-\$200.00
Dues and Subscriptions:			
Ornithological Council	\$2,650.00	\$2,460.00	\$190.00
<i>Paid through restricted funds:</i>			
Grants:			
Student travel grants ¹⁶	\$2,665.00	\$8,500.32	-\$5,835.32
Conservation grants	\$0.00	\$3,870.00	-\$3,870.00
Former chairs fund grants	\$0.00	\$1,800.00	-\$1,800.00
Publications:			
Marine Ornithology (layout, printing, mailings) ¹⁷	\$6,000.00	\$0.00	\$6,000.00
Pacific Seabirds (layout, website) for 4 editions	\$1,500.00	\$0.00	\$1,500.00
InDesign Subscription	\$150.00	\$377.88	-\$227.88
Listserv	\$300.00	\$299.88	\$0.12
Website transition and maintenance services (Anne Francis)	\$1,500.00	\$337.50	\$1,162.50
C. TOTAL SOCIETY SERVICES EXPENSES:	\$144,844.13	\$169,443.42	-\$24,599.29
D. TOTAL PSG BUDGET SUMMARY			
TOTAL INCOME (A)	\$160,410.00	\$199,467.77	
TOTAL EXPENSES (B + C)	\$155,915.13	\$193,631.62	
RESULT: SURPLUS/-LOSS	\$4,494.88	\$5,836.15	

REPORTS OF PSG OFFICERS

FY19 ACTUAL INCOMES AND EXPENDITURES

¹ Life membership income is not included (restricted to the Endowment Fund)

² Includes \$1050 for travel awards and \$1000 repayment of loan to International Ornithological Congress 2018

³ Includes \$2500 sponsorship for 2020 meeting

⁴ Includes \$4,977 from silent auction in 2018 and \$5,407.25 in student travel donations

⁵ Funds for publications (Marine Ornithology and Pacific Seabirds) are derived from endowment fund.

⁶ Includes expenses for Marbled Murrelet Technical Committee Inland Survey Protocol, life member pins, and PSG stickers.

⁷ Includes \$4,188.48 incurred during FY2018 but paid during FY2019

⁸ Includes membership related fees only. Cvent fees associated with the meeting are included in meeting expenses.

⁹ From Local Committee budget. Includes \$7,875 in expenses for 2021 meeting paid during FY2019. Does not include \$3,461.08 in 2019 meeting expenses paid during FY2018.

¹⁰ Includes meeting related fees only. Cvent/RegOnline fees related to membership are included in administrative expenses.

¹¹ Square account opened so that PSG could accept credit card payments.

¹² Student travel awards equal to amount of student travel income generated through silent auction in 2018, donations up to the 2019 meeting, and funds contributed from general fund. This item includes amount contributed from the general fund.

¹³ Travel awards to non-US/Canadian scientists.

¹⁴ Former chairs fund fund-raising amount matched by PSG general fund.

¹⁵ World Seabird Twitter Conference award.

¹⁶ Student travel awards equal to amount of student travel income generated through silent auction in 2018, donations up to the 2019 meeting, and funds contributed from general fund. This item includes silent auction and donation totals.

¹⁷ Includes amount transferred from general fund to Marine Ornithology account only.

PUBLICATIONS OF THE PACIFIC SEABIRD GROUP

The Pacific Seabird Group publishes symposia and other works. PSG Symposia are occasionally held at Annual Meetings; those which have been published are listed below. Technical Reports prepared by PSG working groups are also listed. To order one of these PSG publications, please see instructions after each item. Abstracts of papers and posters given at PSG meetings are published annually. Abstracts for meetings of 1974 through 1993 appeared in the PSG Bulletin (Volumes 2-20); for meetings of 1994 through 2003, in Pacific Seabirds (Volumes 21-30); and for meetings of 1997 and later, at www.pacificseabirdgroup.org. PSG publishes the on-line bulletin Pacific Seabirds (www.pacificseabirdgroup.org) and the journal Marine Ornithology (www.marineornithology.org). Current and past issues of both journals are available online.

SYMPOSIA

SHOREBIRDS IN MARINE ENVIRONMENTS. Frank A. Pitelka (Editor). Proceedings of an International Symposium of the Pacific Seabird Group. Asilomar, California, January 1977. Published June 1979 in Studies in Avian Biology, Number 2. *Available free of charge at* <http://elibrary.unm.edu/sora/Condor/cooper/sab.php>

TROPICAL SEABIRD BIOLOGY. Ralph W. Schreiber (Editor). Proceedings of an International Symposium of the Pacific Seabird Group, Honolulu, Hawaii, December 1982. Published February 1984 in Studies in Avian Biology, Number 8. *Available free of charge at* <http://elibrary.unm.edu/sora/Condor/cooper/sab.php>

MARINE BIRDS: THEIR FEEDING ECOLOGY AND COMMERCIAL FISHERIES RELATIONSHIPS. David N. Nettleship, Gerald A. Sanger, and Paul F. Springer (Editors). Proceedings of an International Symposium of the Pacific Seabird Group, Seattle, Washington, January 1982. Published 1984 as Canadian Wildlife Service, Special Publication. Out of print; *available free of charge at* www.pacificseabirdgroup.org

THE USE OF NATURAL VS. MAN-MODIFIED WETLANDS BY SHOREBIRDS AND WATERBIRDS. R. Michael Erwin, Malcolm C. Coulter, and Howard L. Cogswell (Editors). Proceedings of an International Symposium at the first joint meeting of the Colonial Waterbird Society and the Pacific Seabird Group, San Francisco, California, December 1985. Colonial Waterbirds 9(2), 1986. \$12.00. Order from: Ornithological Societies of North America, PO Box 1897, Lawrence, Kansas 66044; phone (800) 627-0629; no online orders.

ECOLOGY AND BEHAVIOR OF GULLS. Judith L. Hand, William E. Southern, and Kees Vermeer (Editors). Proceedings of an International Symposium of the Colonial Waterbird Society and the Pacific Seabird Group, San Francisco, California, December 1985. Published June 1987 in Studies in Avian Biology, Number 10. \$18.50. *Available free of charge at* <http://elibrary.unm.edu/sora/Condor/cooper/sab.php>

AUKS AT SEA. Spencer G. Sealy (Editor). Proceedings of an International Symposium of the Pacific Seabird Group, Pacific Grove, California, December 1987. Published December 1990 in Studies in Avian Biology, Number 14. *Available free of charge at* <http://elibrary.unm.edu/sora/Condor/cooper/sab.php>

STATUS AND CONSERVATION OF THE MARBLED MURRELET IN NORTH AMERICA. Harry R. Carter and Michael L. Morrison (Editors). Proceedings of a Symposium of the Pacific Seabird Group, Pacific Grove, California, December 1987. Published October 1992 in Proceedings of the Western Foundation of Vertebrate Zoology, Volume 5, Number 1. \$20.00. Available free of charge at www.pacificseabirdgroup.org

THE STATUS, ECOLOGY, AND CONSERVATION OF MARINE BIRDS OF THE NORTH PACIFIC. Kees Vermeer, Kenneth T. Briggs, Ken H. Morgan, and Douglas Siegel Causey (editors). Proceedings of a Symposium of the Pacific Seabird Group, Canadian Wildlife Service, and the British Columbia Ministry of Environment, Lands and Parks, Victoria, British Columbia, February 1990. Published 1993 as a Canadian Wildlife Service Special Publication, Catalog Number CW66-124 1993E. *Order free of charge from:* Publications Division, Canadian Wildlife Service, Ottawa, Ontario, K1A 0H3, Canada

PUBLICATIONS OF THE PACIFIC SEABIRD GROUP

BIOLOGY OF MARBLED MURRELETS—INLAND AND AT SEA. S. Kim Nelson and Spencer G. Sealy (Editors). Proceedings of a Symposium of the Pacific Seabird Group, Seattle, Washington, February 1993. Published 1995 in *Northwestern Naturalist*, Volume 76, Number 1. \$12.00. *Available free of charge at* www.pacificseabirdgroup.org

BEHAVIOUR AND ECOLOGY OF THE SEA DUCKS. Ian Goudie, Margaret R. Petersen and Gregory J. Robertson (editors). Proceedings of the Pacific Seabird Group Symposium, Victoria, British Columbia, 8-12 November 1995. A special publication compiled by the Canadian Wildlife Service for the Pacific Seabird Group. Published 1999 as Canadian Wildlife Service Occasional Paper number 100, catalog number CW69-1/100E. Order free of charge from: Publications Division, Canadian Wildlife Service, Ottawa, Ontario, K1A 0H3, Canada, or *available free of charge at* www.pacificseabirdgroup.org

SEABIRD BYCATCH: TRENDS, ROADBLOCKS AND SOLUTIONS. Edward F. Melvin and Julia K. Parrish (editors). Proceedings of an International Symposium of the Pacific Seabird Group, Blaine, Washington, 26-27 February 1999. Published 2001 by University of Alaska Sea Grant, Fairbanks, Alaska. Publication no. AK-SG-01-01. \$40.00. *Order from publisher.*

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OIL AND CALIFORNIA'S SEABIRDS. Harry R. Carter (convener) and Anthony J. Gaston (editor). Proceedings of a Symposium of the Pacific Seabird Group, Santa Barbara, California, February 2002. Published 2003 in *Marine Ornithology* 31(1). *Available free of charge at* www.marineornithology.org

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BIOLOGY AND CONSERVATION OF XANTUS'S MURRELET. Harry R. Carter, Spencer G. Sealy, Esther E. Burkett, and John F. Piatt (editors). Proceedings of a symposium of the Pacific Seabird Group, Portland, Oregon, January 2005. Published 2005 in *Marine Ornithology* 33(2):81-159. *Available free of charge at* www.marineornithology.org

SEABIRDS AS INDICATORS OF MARINE ECOSYSTEMS. John F. Piatt and William J. Sydeman (editors). Proceedings of an International Symposium of the Pacific Seabird Group, Girdwood, Alaska, February 2006. Published 2007 in *Marine Ecology Progress Series* Volume 352:199-309. *Available free of charge at* <http://www.int-res.com/abstracts/meps/v352/#theme>

THE SALISH SEA ECOSYSTEMS: STATUS AND IMPACTS OF CHANGES ON MARINE BIRDS. Scott Hatch (editor), Douglas F. Bertram, John L. Bower, and Patrick D. O'Hara (guest editors.) 2009. *Marine Ornithology*, Salish Sea Symposium Issue 37: 1-76. *Available free of charge at* <http://www.pacificseabirdgroup.org/publications/Hatch.etal.2008.pdf>

Information on presenting symposia: Pacific Seabird Group Symposia or Paper Sessions may be arranged by any member who is interested in a particular topic. Before planning a special session, refer to Meetings/Symposia Guidelines at www.pacificseabirdgroup.org; also contact the Scientific Program Chair for the annual meeting.

PUBLICATIONS OF THE PACIFIC SEABIRD GROUP

TECHNICAL PUBLICATIONS

EXXON VALDEZ OIL SPILL SEABIRD RESTORATION WORKSHOP. Kenneth I. Warheit, Craig S. Harrison, and George J. Divoky (editors). Exxon Valdez Restoration Project Final Report, Restoration Project 95038. PSG Technical Publication Number 1. 1997. *Available free of charge at* www.pacificseabirdgroup.org

METHODS FOR SURVEYING MARBLED MURRELETS IN FORESTS: A REVISED PROTOCOL FOR LAND MANAGEMENT AND RESEARCH. Pacific Seabird Group, Marbled Murrelet Technical Committee. PSG Technical Publication Number 2. 2003. *Available free of charge at* www.pacificseabirdgroup.org

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Committees do much of PSG's business, as well as the conservation work for which PSG is respected. The committees welcome (and need) information concerning their issues. Please contact one of these Coordinators with input, updates, to apply for a small grant (see PSG's website for eligibility), or if you wish to help a committee with its work.

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Members receive the following benefits: announcements of meetings, reduced rates on conferences and some publications, subscription to the PSG listserv, and most importantly, the knowledge of contributing to the study and conservation of Pacific seabirds wherever they occur. Annual memberships are available for one year or two years and expires on the date of purchase. Lifetime memberships are also available. All Life member contributions are dedicated to PSG's Endowment Fund, a fund to support the publications of the PSG, principally *Marine Ornithology*.

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Individual membership: US\$50

Two-year individual membership: US\$90

Student membership: US\$30

Two-year student membership: US\$55

Life membership: US\$1,500 (can be divided into 5 annual payments of \$300)

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To join the Pacific Group or renew your membership, please go to: <http://tiny.cc/psgmember>

To edit information on an existing membership, please follow the link above and login using the e-mail address that you used to renew your membership (which may be different from your mailing-list e-mail address).

If you have any questions, please notify our Membership Coordinator: membership@pacificseabirdgroup.org

The Membership Coordinator is responsible for maintaining the membership database, assisting members with updating their information, sending new member information to the listserv coordinator, and other member assistance as needed.

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